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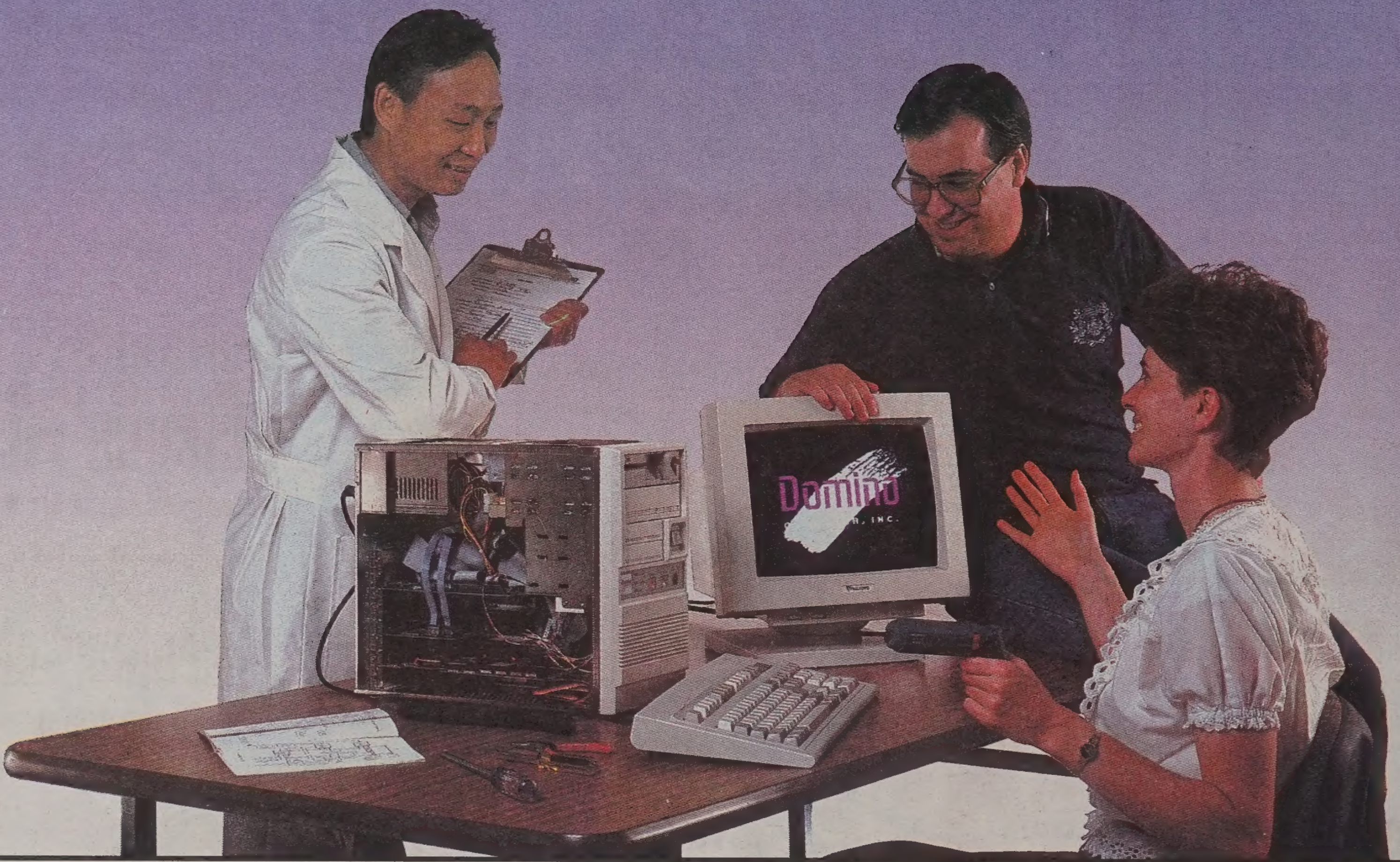
NEW SECTION BEGINS ON PAGE 68

SPECIAL SECTION INSIDE!

MultiMedia & Beyond

In This Issue:
D'Cückoo,
HyperStudio,
24-bit Amiga

You Build Your Own Computer



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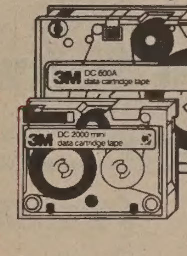
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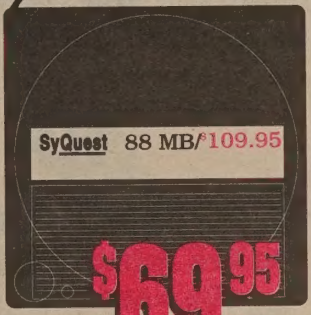

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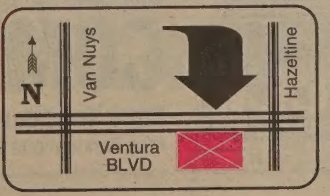

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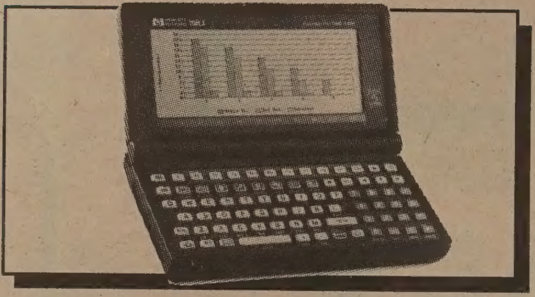

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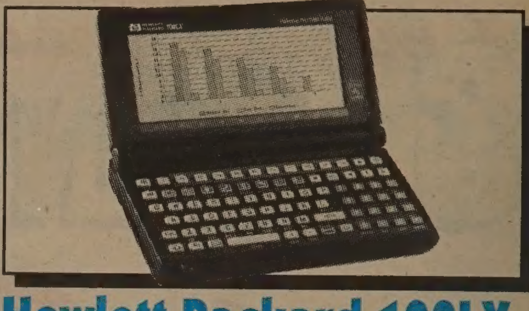

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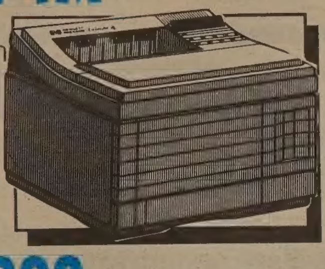

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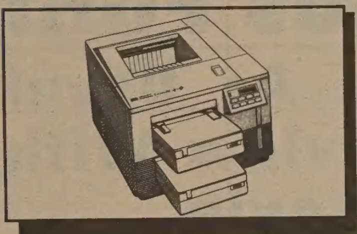

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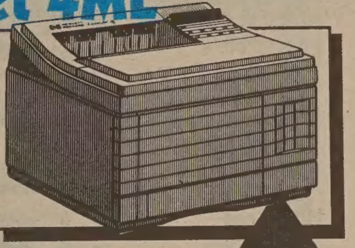

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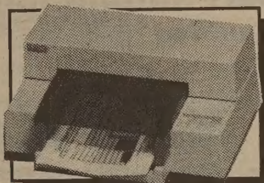

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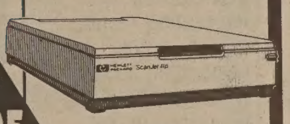

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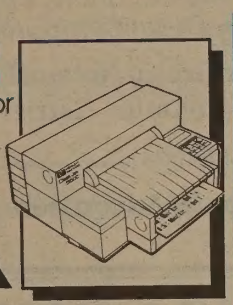

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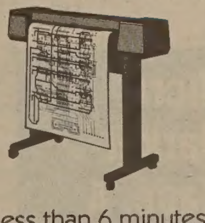

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A NOTE FROM THE EDITORS

As we discovered early in the magazine's existence, there is a considerable overlap between the science fiction and computer communities, and the cross-fertilization between the two cultures produces some pretty interesting results. In view of the impending arrival of this year's Worldcon in San Francisco, we decided to have some fun this issue and spotlight the computer/sci-fi interaction. So, in addition to previewing Worldcon itself, we're happy to bring you this month's cover story, in which Spectrum HoloByte's Gilman Louie discusses, among other things, the future of Star Trek gaming, and some original science fiction by Autodesk co-founder John Walker. Enjoy!

—ME

Micro Marketplace, A Special Advertising Section For Southern California Computer Buyers, Starts On Page 68.

COVER STORY

Serious Fun: Business As Usual

An Interview With Gilman Louie

By Mary Eisenhart 56

Cover photo: Michael Jay

Since its beginnings as a kitchen-table startup, Spectrum HoloByte has survived and prospered in a volatile entertainment marketplace. Recently extricated from the collapsed Maxwell empire by a broad-based group of investors, the company's on an ambitious growth path that includes everything from game cartridges to VR parlors. Chairman and co-founder Gilman Louie updates us on the state of the ongoing adventure.

Preview: ConFrancisco 77
The science fiction world converges on Moscone Center for five days of ideas and revelry.

Fiction Special: We'll Return After This Message
By John Walker 78
Two programmers take an unusual approach to the search for extraterrestrial intelligence.

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Online democracy: the adventure continues.

Dvorak's Last Column *By John C. Dvorak* 158
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By Robert Moskowitz 38
How "technographers" increase an organization's productivity and team members' participation.

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HyperStudio: Multimedia For The Masses *By Tony Reveaux* 130
An authoring program simple enough for kids.

Amiga Multimedia Tools *By Douglas J. Nakakihara* 138
Retina delivers 24-bit color to the Amiga.

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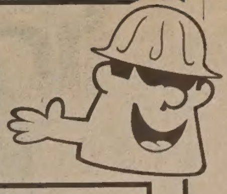

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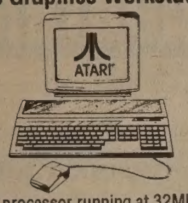

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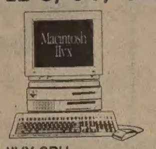

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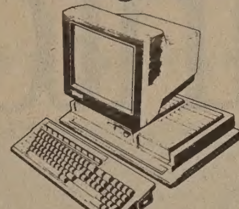

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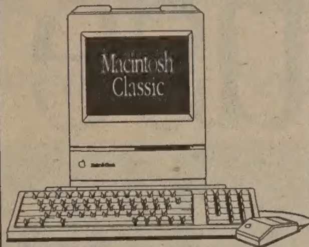

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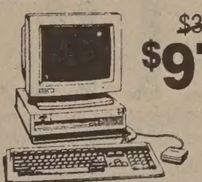

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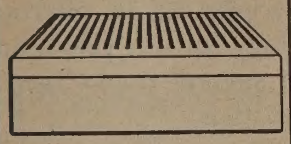

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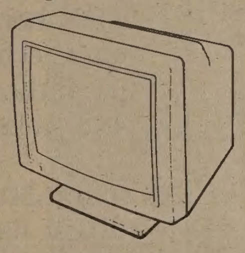

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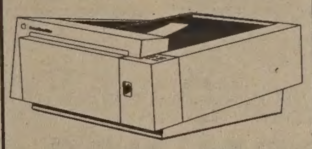

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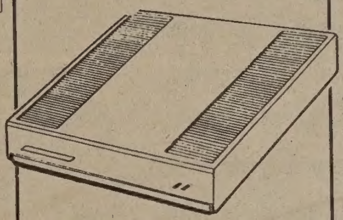

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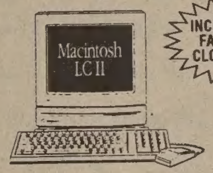

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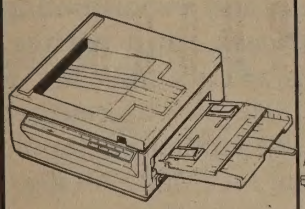

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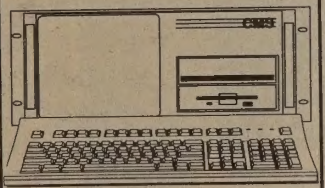

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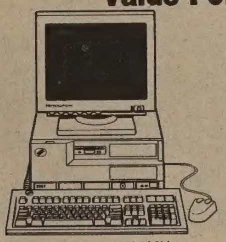

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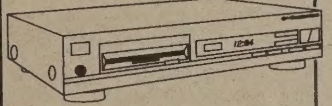

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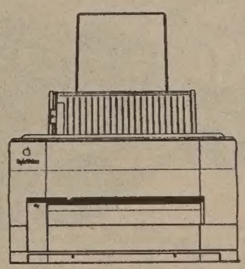

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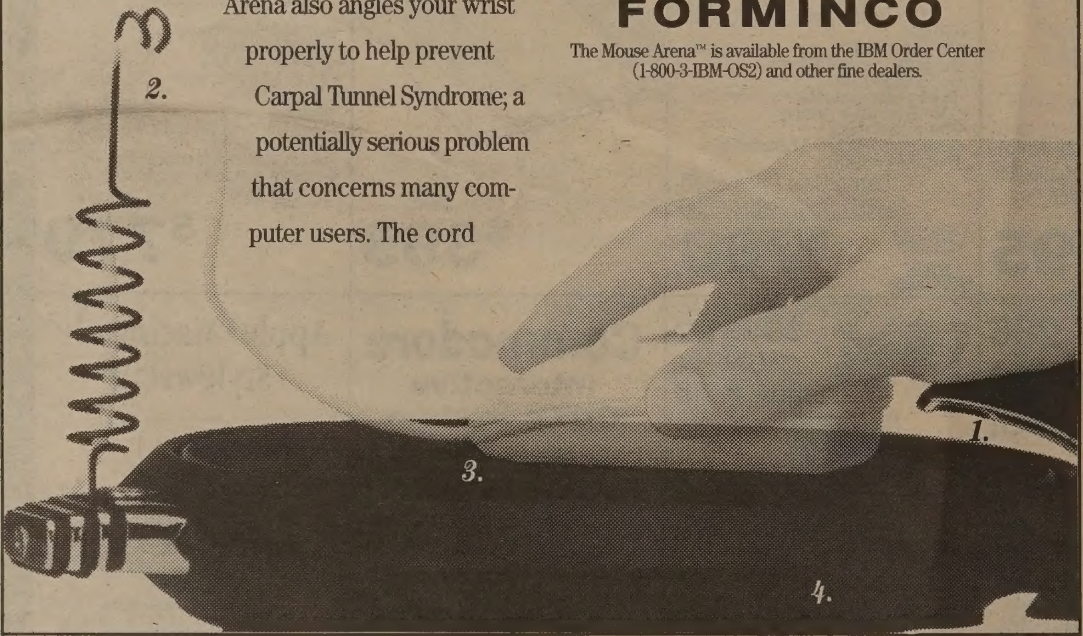

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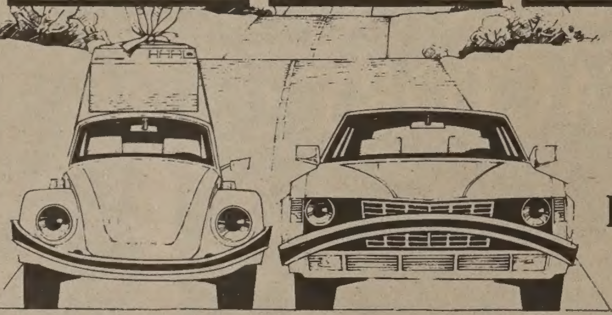

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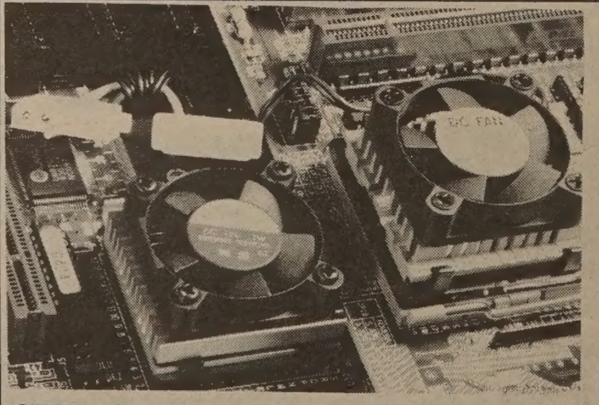

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INDUSTRY INSIGHT

Novell's Perilous Path To World Domination

Networking Leader Has All The Pieces But Might Not Be Able To Assemble The Puzzle

BY PAUL HOFFMAN

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Paul Hoffman is an industry analyst who has been covering microcomputer technology for ten years. He can be reached on Internet (phoffman @well) or CompuServe (71545,346). He also writes popular microcomputer books.

Network giant Novell has repeatedly made the news over the past few months, but may be slowly losing ground in its bid for total network dominance. Its recent announcements for future plans on major issues such as management, security, and applications development have received almost universal responses of "We'll believe it when we see it," giving third parties and Novell's competitors ample room for competition. The new version of NetWare released a few months ago has also barely gotten off the ground.

> THE NETWORKING MARKET IS RAPIDLY BECOMING THE INTERNETWORKING MARKET, WHERE SMALL NETWORKS ARE EXPECTED TO FULLY INTERCHANGE DATA WITH LARGER IN-HOUSE AND WORLDWIDE NETWORKS.

Still, Novell is in no danger of rapid decline. It controls the most popular PC networking software, NetWare, and now also owns strategic additional product lines, notably DR DOS (the best clone of MS-DOS) and master rights to UNIX, recently acquired from AT&T. NetWare and UNIX will continue to be major cash cows for many years, even if their current competitors gradually take over market share. But Novell's percentage of the networking market will surely decline if it doesn't answer users' demands for easier-to-use and less expensive solutions, making it yet another of the microcomputer industry's has-beens.

Four months ago, Novell released v4.0 of NetWare, emphasizing how much more advanced it was than v3.11, the version most Novell users run. However, sales of 4.0 have been very slow, according to dealers. Companies with just one server and an expert network administrator have generally upgraded, but other have held back, due to the massive amount of effort needed.

Now, it turns out that those with a wait-and-see attitude were probably smart not to jump too early. Novell just released v4.01 with two major performance improvements in important areas. Such a performance release wouldn't be such a big deal, except that you cannot run both 4.0 and 4.01 on the same network, which forces large NetWare sites to upgrade all their 4.0 servers at once.

Because network servers are so critical to most companies, they are often unwilling to make changes on a moment's notice, especially if the new software requires significant reconfiguration. Thus, many companies bought one or two copies of 4.0 in order to assess how much reconfiguration would be needed with many servers. Also, because NetWare servers usually exist on networks with other non-Novell servers, it is a good idea to extensively test v4.0 with the other servers that have often been tweaked to work with v3.11. That testing will have to be performed again with v4.01 to assure safety.

Of course, this new release will worry many LAN managers with the prospect of even more releases with bug fixes, as they try to strike a balance between having to duplicate their efforts and waiting so long as to miss the substantial improvements of the new versions. Many network consultants say they expect Novell clients to wait as long as a year before seriously attempting to upgrade to whatever the current v4 is at that time. Meanwhile, Novell has promised that all v4 updates until April 1994 will be free.

The slow acceptance of v4.0 is by no means Novell's only problem right now. Their recent announcements concerning large network issues have garnered only ho-hum reactions and have often helped their competitors, who today have the features that Novell is promising to create a year or more in the future. Novell's announcements in security, management, development, and so on are meant to reassure current clients, but people have gotten used to Novell promising the world and then delivering only a small part, later than expected.

In July, Novell submitted NetWare 4.0 to the National Computer Security Center (NCSC), the arbiters of the security of system software for the federal government. Novell trumpeted this as their first move "to provide mainframe-level security in the PC environment." However, they had to submit NetWare with a third-party product in order to even qualify, and they are attempting to get the fairly loose C2 rating. Other PC operating systems already qualify for the C2

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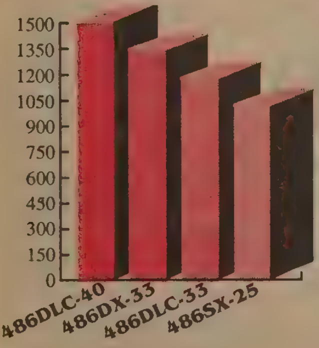

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continued from page 12

rating, and some qualify for the stricter B-level ratings. Major Novell competitors such as Banyan submitted their products to the NCSC months before Novell. And of course, there is no guarantee that Novell will get even the C2 rating.

Novell is also hoping that developers use its forthcoming GNU development tools to create NetWare Loadable Modules (NLMs) on many hardware platforms and UNIXWare. Cygnus Support is working with Novell to create compilers that will generate NLMs for all computers from the same source code with a single recompilation, although a certain amount of hand-tuning will probably be necessary. Currently, most developers create NLMs only for one system, most often NetWare running on PCs. However, because the tools won't be ready for at least six months, developers will probably continue to create single-target NLMs and will continue to be frustrated with Novell's lack of portability.

Novell's lock on the networking market will probably loosen as its competitors convince customers of their greater agility and commitment to open standards. The networking market is rapidly becoming the internetworking market, where small networks are expected to fully interchange data with larger in-house and worldwide networks. With a wider purview, network administrators are demanding better management interfaces, better security interoperation, and more responsive vendors. Because other networking companies have done more just to get the small part of the market that they have, Novell could look worse if their future directions don't become reality quickly.

ETHERNET: MORE SPEED, POSSIBLE CONFLICTING STANDARDS

Ethernet has been the standard for networking for more than a decade, and its longevity is a testament to its initial design. At its fastest, Ethernet passes information at 10 megabits per second, an incredible rate ten years ago and still pretty good even in today's PC market.

But bandwidth-hogging applications like full-motion video and high-resolution color image processing have started to bog down the best of the Ethernet systems. People want faster Ethernet, and the commercial sector is ready to update the Ethernet standard to 100 megabits per second, a tenfold increase in a single step.

The problem is that there will probably be two different ways to go.

Earlier this year, Grand Junction Networks announced a new technology allowing current Ethernet users to get 100 megabits per second using their current wiring. That technology, originally called Fast Ethernet but now called 100Base-X to avoid confusion, uses most of the same Ethernet hardware that currently exist in most PC and minicomputer sites such as 10Base-T cables, hubs, and so on. It applied to the IEEE, the standard organization of most merit in the US, to make 100Base-X the next standard for Ethernet. Grand Junction is a new company founded last year specifically to get 100Base-X off the ground.

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More recently, a consortium headed by AT&T and Hewlett-Packard has proposed a different 100-mbps standard, dubbed 100Base-VG. The different standard would force many offices to rewire due to its different use of the signals in the 10Base-T wiring, but the proposal has some technical merits that would make the system more efficient. The second group has also applied to the IEEE for a blessing of the standards.

As you might guess, having more than one standard for the same thing is sure to have a very negative impact on the end-user. All 100-mbps systems on a network would have to use either one of the standards: the two definitely cannot interoperate due to major technical differences in the way that data is put on the wire. Of course, both sides claim that their method is better, and both sides point out flaws in the other's system. If both become standards, you will have to pick one before migrating from current Ethernet to the new, faster Ethernet.

ALTHOUGH MICROSOFT'S COMPETITORS GOT NOTHING FROM THE FTC, IT IS NOT CLEAR WHAT THEY WOULD HAVE GOTTEN EVEN IF THE FTC HAD DECIDED THAT MICROSOFT HAD ACTED IN A MONOPOLISTIC FASHION.

The major advantages of Grand Junction's 100Base-X is that it's based on technology that twenty million people already use and many manufacturers are already behind it. The major advantages of 100Base-VG is that it uses the data bandwidth better by avoiding data conflicts and that it is backed by two giants, AT&T and Hewlett-Packard. To current end-users, 100Base-X will look much more attractive because it won't require them to change their current wiring at all.

The IEEE took the interesting step of having two different standards subcommittees look at the competing standards, assuring that (if they are both technically complete and useful) they will both get standards designations. In an interesting political move, 100Base-X will be evaluated by the 802.3 group, the primary keeper of the Ethernet flame. 100Base-VG will be evaluated by a new group, 802.12. In this way, both standards processes will proceed without interference from the competing group.

FTC DECLINES TO PRESS CHARGES AGAINST MICROSOFT

To no one's great surprise, the Federal Trade Commission decided not to issue a complaint against Microsoft for its conduct in the operating system market. Many of Microsoft's competitors in the applications market had hoped that the FTC would force Microsoft to separate its operating system and applications divisions so that Microsoft's programs do not have an unfair advantage when they are released. Other companies, notably Novell, had hoped that the FTC would force Microsoft to be less monopolistic in the operating system market. Instead, the FTC did nothing, even after prodding from Senator Howard Metzenbaum.

Although Microsoft's competitors got nothing from the FTC, it is not clear what they would have gotten even if the FTC had decided that Microsoft had acted in a monopolistic fashion. While the advantages that some Microsoft divisions get from inside information are valuable, the value is very short-lived in the marketplace. For example, even though Microsoft products often incorporate new Windows features before competitors do, those new features do not result in many sales. On the operating system side, even though MS-DOS has clearly benefited from the impression that it is the only PC operating system, it is not clear how many people really care that much even if they knew about MS-DOS's competitors, which are widely reviewed and discussed in the computer press.

Humorously, Microsoft's chief lawyer William Neukom was quoted as calling MS-DOS and Windows "open platforms," when in fact they are excellent examples of incredibly closed platforms that happen to be successful. Microsoft must be so taken by its own dominance of the microcomputer market that it feels justified in changing the definition of "open."

In the meantime, Microsoft's competitors will probably continue to try to get Congress or the Senate to look into their complaints, but the outcome of any hearings (if they even get scheduled) will probably be as insignificant as the FTC investigation. ■

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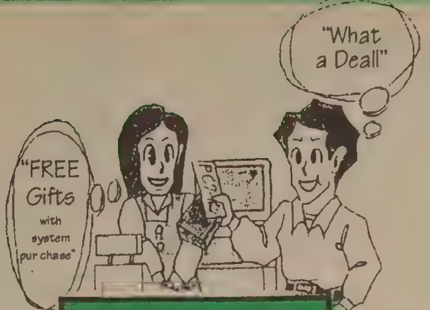
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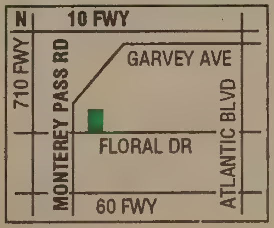

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REALIZABLE FANTASIES

These columns concern the near future—futures that we can create without technological breakthroughs.

The last several columns have concerned computer enhancements to Californians' power to participate in their own governance. They have detailed a "Great Equalizer"—far more powerful than a Colt .44—that can help counterbalance the power of well-funded lobbyists and special-interest political insiders.

This fantasy is approaching realization—or death. We can see the light at the end of the tunnel; we just can't tell whether it's light from an oncoming train, or from sunshine that will rekindle the flames of freedom from the ashes of cynicism.

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REAL-WORLD POLITICS: TO FREEDOM OR THE GRAVE

[For new readers: Assembly Bill 1624 (Bowen, D-Torrance) would mandate free, statewide, online public access to legislative records, state statutes, and the baroque state Constitution—at essentially no cost to the state, by using a low-cost file server and the public computer networks that blanket the state.]

One way or another, the California State Legislature will act by September 10th, when they close up shop and return to their districts. (*Joy!* Then we can get back to techno-fantasies—if AB1624 passes.)

First, the Senate: By the end of August, the California State Senate will vote on AB1624. If Senate Rules Committee Chair David Roberti (D-Van Nuys area) supports the bill, it will pass Rules, and almost certainly pass Senate Appropriations since the Legislative Data Center can use its current equipment and Internet connections to implement it—and then will pass the full Senate.

> One or two unelected senior bureaucrats and some former legislative aides who are selling legislative information for *big* bucks have illustrated a *potent* ability to guide (control?) Burton on this matter.

If Senator Roberti defers to some of the powerful bureaucrats and political insiders who oppose AB1624, it'll die in Senate Rules. Yes, he's that powerful.

Then, the Assembly: If it passes the Senate, it returns to the State Assembly for "concurrence in amendments"; i.e., they can only accept it as amended (improved!) in the Senate, or kill it. If Assembly Rules Committee Chair John Burton (D-San Francisco) or Assembly Speaker Willie Brown (D-San Francisco) favor it, it will pass the Assembly and the Legislature. The Republican leadership and a number of Democrats are official coauthors of the bill, but they don't really make any difference if Burton or Brown oppose it. Yes, they are that powerful.

And so far, one or two unelected senior bureaucrats and some former legislative aides who are selling legislative information for *big* bucks have illustrated a *potent* ability to guide (control?) Burton on this matter.

And finally, the Governor: If the Legislature passes AB1624, then Gov. Pete Wilson (R-San Diego) will sign it into law, or kill it. Note: Wilson's Deputy Chief of Staff is Executive VP of State Net, and his appointee to the Fair Political Practices Committee is Senior VP of State Net—one of the two largest peddlers of online public legislative data (e.g., charging $4200 for 2880 minutes—that's the way they phrased it—under a 24-month contract).

Ongoing public input to these four individuals (copied to the bill's author) will decide the fate of this bill. It's the *only* thing

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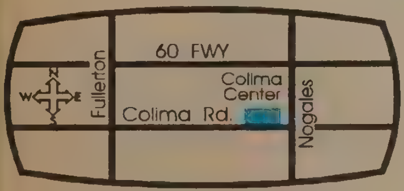

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WIDE DIVERSITY OF SUPPORTERS

Contrary to some legislators' first assumptions, AB1624 is not merely for "a few elite computer nerds." Consider *some* of the fifty-plus organizations supporting AB1624, at press time:

California Common Cause, CalPIRG (California Public Interest Research Group), League of Women Voters of California, Palo Alto Working Group on Civil Liberties, L.A. Women's Legislative Coalition.

John Burton, David Roberti and Pete Wilson can and may disregard widespread support for AB1624, if they hear little or nothing from additional organizations and voters in their districts—while adroit opponents continue to whisper sweet nothings to them via their insiders' access.

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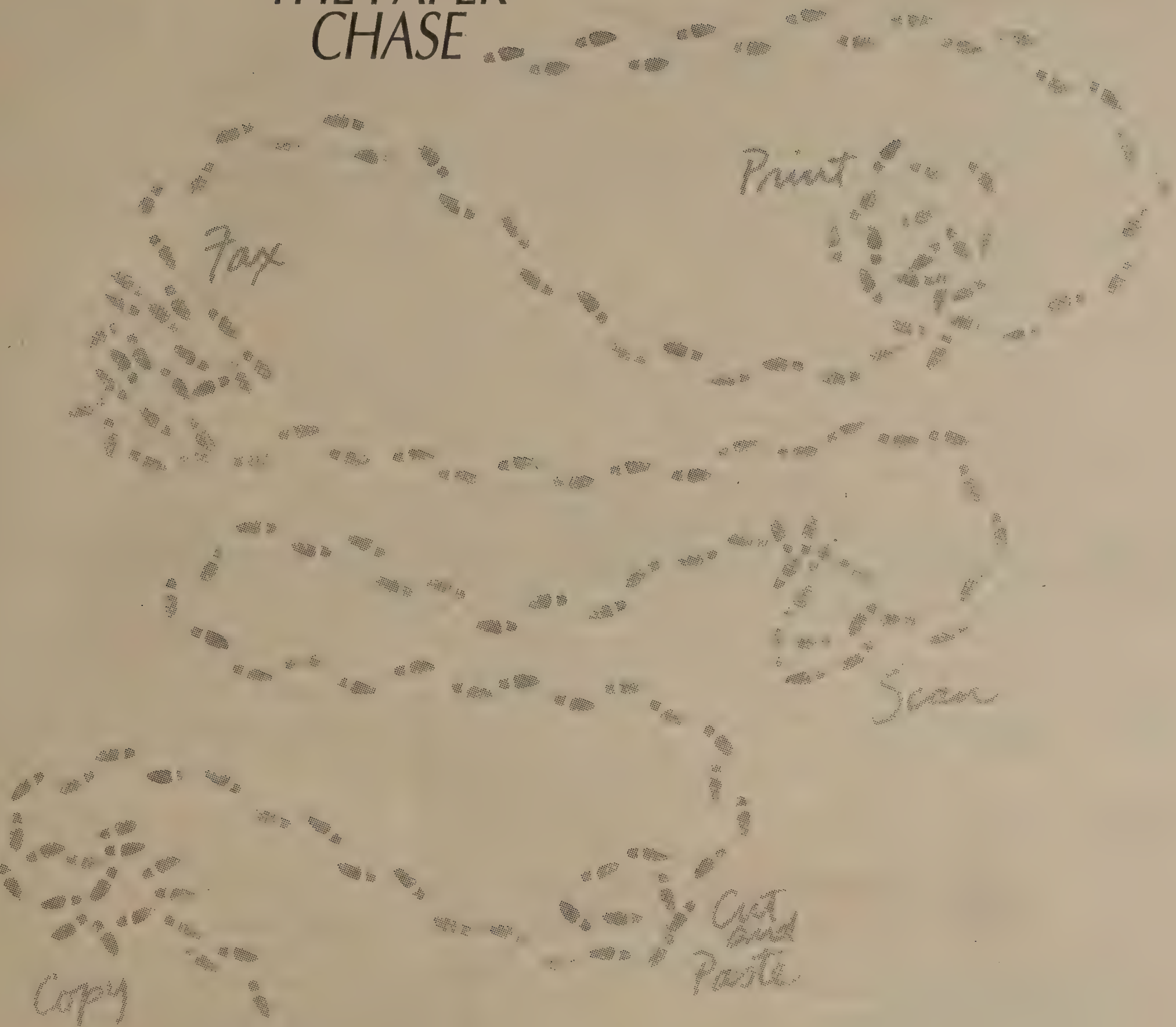

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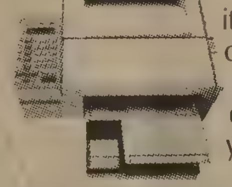

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Oh yes, and also technoid groups such as EFF (Electronic Frontier Foundation), CPSR (Computer Professionals for Social Responsibility), Computer Software Industry Association, Apple Computer, Autodesk, Sunnyside Computing, etc.

John Burton, David Roberti, and Pete Wilson *can and may* disregard this support, if they hear little or nothing from additional organizations and voters in their districts—while adroit opponents continue to whisper sweet nothings to them via their insiders' access.

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Letters and faxes are needed—from individuals, companies, and organizations—to [1] bill author Hon. Debra Bowen, State Capitol, Room 3126, Sacramento, CA 95814; fax/916-327-2201; [2] Roberti, Room 205; [3] Burton, Room 3152; [4] Brown, Room 219; [5] Gov. Pete Wilson; *and* to your own [6] Assembly Member, [7] State Senator. *Now!*

THE HORSE'S MOUTH

Jim Warren often speaks on computing futures (and history), and about technology and government policies. Among other things, he will be the keynote speaker at the BBSCON '93 convention for bulletin board system operators in Colorado Springs, August 25–29 (303/693-5253). ■

Warren founded InfoWorld, *Wireless Digital, Initiative, Inc. and one of the nation's largest public microcomputer conventions. He was founding host of PBS's* Computer Chronicles, *founding editor of* Dr. Dobb's Journal, *and has chaired various trade and professionals' organizations. He holds graduate degrees in computing (Stanford), medical information science (UC Medical Center), and mathematics & statistics. He has been a computer professional since 1968, and was a mathematics teacher and professor for ten years before that.*

He organized and chaired the landmark First Conference on Computers, Freedom & Privacy (1991) and was one of the first to receive the Electronic Frontier Foundation Pioneer Award (1992). He is a member of the board of directors of Autodesk, Inc.

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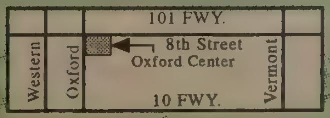

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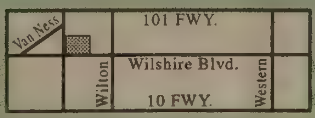

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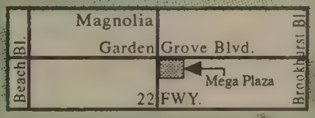

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Dauphin, Newton, Tandy Zoomer

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With the impending release of the Apple Newton, interest in pen-based computing has been on the rise. Smaller, lighter, and more powerful pen-based and palmtop machines continue to appear.

I decided to take a look at another pen-based machine, a smaller one than the notebook-sized units common in the industry today, to see the current state of the art in machines running Microsoft's Windows for Pens and other competing pen-based operating systems.

The Dauphin DTR-1

The Dauphin DTR-1 (DTR stands for "Desktop Replacement") is a subnotebook-sized pen-based computer with a detachable keyboard. Like the GRiD Convertible, it is thus capable of both keyboard and pen-based use. The operating system is Windows for Pens, which is essentially Microsoft Windows 3.1 with software enhancements that enable it to recognize pen input.

Weighing in at 2.5lbs. and sporting dimensions of 9" x 5.5" x 1.25" (without the detachable keyboard), this machine is much smaller than previous pen-based machines, even light enough to hold in your hand (though you wouldn't want to do this for very long). At a list price of $2495, it comes with 4MB of RAM (expandable to 6MB); a 40MB hard drive; a 6" diagonal, backlit, passive matrix, VGA-compatible LCD screen; and parallel, serial, and external hard/floppy drive ports (IDE-compatible drives can be installed externally using a proprietary connector from Dauphin).

In addition, the unit has an 800 x 600 external super VGA video output, allowing you to use the machine as a kind of miniature desktop unit. The detachable keyboard uses a PS/2-style keyboard port, and you can use either the provided detachable keyboard or attach your own full-sized keyboard with a PS/2 keyboard port adapter. Apparently an inexpensive adapter is available that allows "normal" PC keyboards to use a PS/2 port. Optional accessories include a fax modem and Ethernet adapter, both of which can be installed internally.

This pen-based machine can be used like a small computer. I tried typing on the supplied keyboard; it is a bit cramped, but quite serviceable. To use the DTR-1 like a subnotebook computer, you can strap the display unit into its carrying case, which can be propped open with the keyboard resting just below the display. The AC adapter that comes with the machine is very small and lightweight; Dauphin told me it was designed that way to enhance portability.

This machine is a lot smaller and lighter than the GRiD Convertible, which I reviewed several months ago; its operation is more or less identical. Like the Convertible, the Dauphin has an optional keyboard (in this case, it is a separate unit, unlike the Convertible, which uses a clever flip-up design to expose the keyboard), and also, like the Convertible, it runs Windows for Pens and other MS-DOS-based pen operating systems.

After using the DTR-1 for a while, however, I'd have to say that this machine is still a different category from the proposed Newton technology, despite its smaller size. It's still quite heavy and rather bulky compared to a palmtop unit; after all, it is a full-blown 486SLC-based machine with a 40MB hard disk. As the name implies, DTR (Desktop Replacement), it is much like a desktop machine.

Remarkable though the slim packaging is, this is still not really the kind of lightweight palmtop unit I believe will be necessary for pen-based computing to really take off in the general marketplace. This machine is intended for point-of-purchase sales use and forms applications, not for general use. Though the DTR-1 has an excellent niche as both a subnotebook computer and a pen-based machine for vertical market applications and horizontal sales force uses, at $2495 and 2.5lbs. it is nevertheless not in the handheld mass-market category yet.

Since the main advantage of pens is that it allows you to have full use of the screen of a small, portable machine without taking up space with a bulky keyboard, I believe small size is eventually going to be essential for mass-market acceptance of pen computing. As a lightweight pen-based machine, however, the Dauphin could well be a very good alternative to the bulky pen-based machines that have been in use until this time for sales and other similar applications.

The difficulty I had with Microsoft Windows for Pens, however, points out the need for a different, custom-made operating system for palmtop use. Not only does Windows for Pens (like PenPoint) take up a lot of disk space, but the handwriting recognition is rather poor at best. Other, more lightweight operating systems such as PenDOS (which reputedly has a much better handwriting recognition rate) and the new pen-based GEOS operating system (used in the new Tandy Zoomer—see below), may well be the way pen computing goes in the ultra-portable computing domain which is where I believe it will find its greatest acceptance.

Newton News

Apple has announced collaborations with a number of communications companies with which it hopes to set up a variety of information services accessible via the

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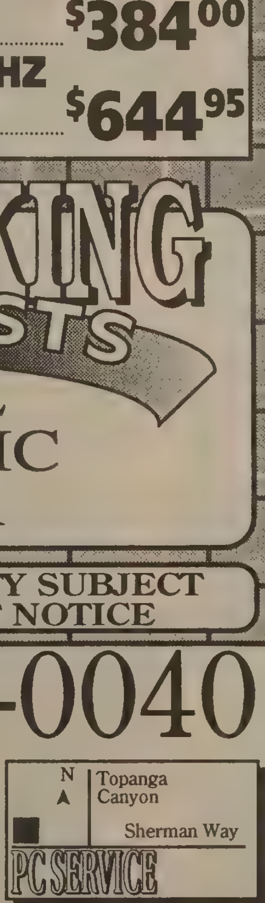

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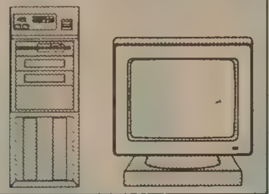

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Newton PDA (Personal Digital Assistant) and other Apple personal interactive electronics products.

Ameritech plans to provide notification of fax and voice messages, delivering them to Newtons or other devices. BellSouth and USWest intend to prototype screen-based phone devices of some sort (though the exact nature of what this might entail is not entirely clear). Siemens and ROLM have been collaborating with Apple since March on the development of NotePhone, a combination of Siemens-ROLM and Newton technology which will provide access to telephone and fax features.

AppleLink, Apple's information and communication service, has also added a variety of new information services from Reuters, RR Donnelley, GeoSystems, Dow Jones, Ziff Desktop Information, USA Today, Grolier Electronic Publishing, and Tribune Media Services. Support for connecting to these services is expected to be included with products in the Newton family. Information from ZiffNet Selections, including industry news, product reviews, and downloadable software from Ziff publications like *MacUser*, *MacWEEK*, and *PCWeek* will be included. A daily newsletter from the *Wall Street Journal*, CustomClips news clipping service, and Company Reports service will be provided by the Dow Jones news service. Tribune Media Services intends to provide feature columns (horoscopes, etc.) as well as a TV listings service and stock market news. Grolier will provide its Academic American Encyclopedia. *USA Today* and Reuters intend to provide clippings from their news services, and Central Weather will provide a 24-hour weather service for over 130 cities around the world. Travel information to be added will include Road Trip Planner from GeoSystems, a road trip planning service, and Worldview TripPlan. A new Mobile Computing area will cover portable products like the Newton.

The DTR-1 is much smaller than previous pen-based machines, even light enough to hold in your hand.

Newton applications will be developed using the Newton Toolkit, which provides graphical layout capabilities, and uses the NewtonScript programming language, an object-oriented environment which will provide developers with rapid debugging turnaround times. Newton applications can be built up as a collection of interacting software objects, using a powerful set of reusable application objects provided with the toolkit. Authoring and content tools will also be provided with the toolkit.

Tandy Zoomer

Tandy has announced its Z-550 Zoomer PDA, a pen-based palmtop machine intended to compete in the same market as the Apple Newton. The unit weighs just under 1lb. and operates for up to one hundred hours on three AA batteries, according to Tandy.

It comes with an impressive array of built-in software that is usually optional with current palmtop computers. Built-in

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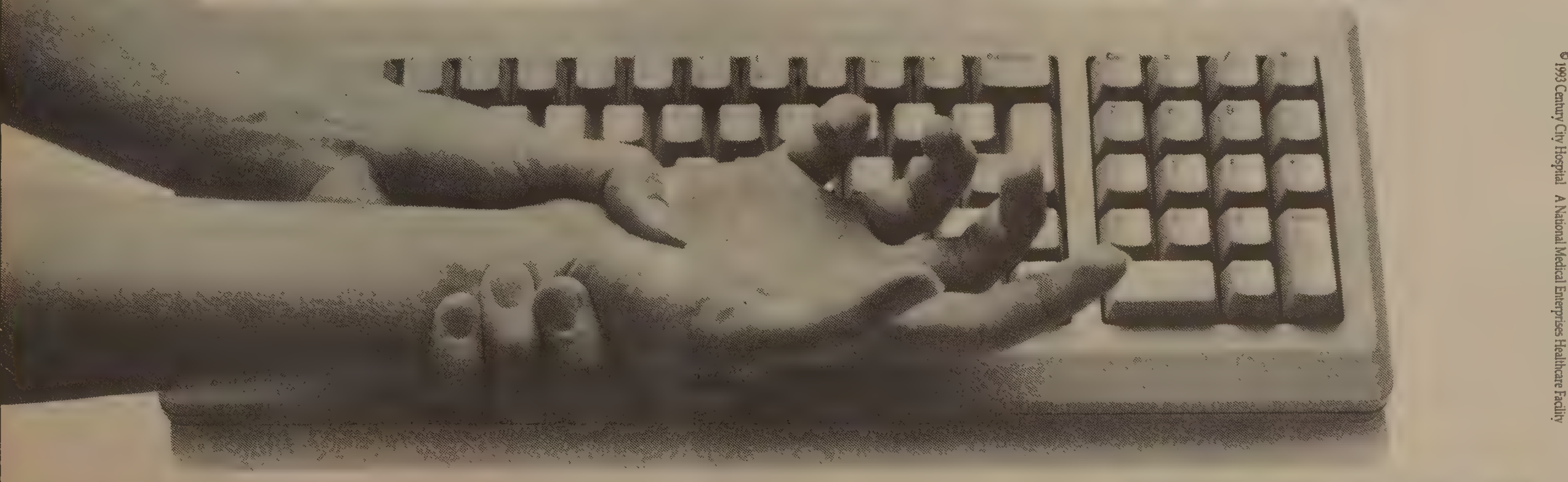

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If you're interested in day-to-day average Windows applications, the new efficient Cyrix or AMD CPUs may be exactly the right solution for you. As you can see, even the economical Cyrix 40Mhz version of the 486 chip outpaces the Intel-33—at a cost that is $100's less!

Above you'll see two great Cyrix-powered 40Mhz systems ranging from $1265 to $1645—each delivering more power than similarly configured Intel-33Mhz systems. That much power at these prices is hard to resist!

The new AMD 40 Mhz chip was years in development and now brings even more power to your desk at very reasonable prices. This CPU has exactly the same specifications (8K onboard CPU-cache and built-in 487 coprocessor) as the Intel 486—except, of course, it runs almost 25% faster. And, naturally, it comes to you for $100's less! A look at our basic AMD-driven local bus system above gives you the idea. For $1825, you'll get a CPU that runs 25% faster than Intel's 33Mhz 486DX, a 250MB HD working at 4MB/sec across the local bus (about 7-times faster than ISA speeds) and an S3-805 Windows accelerated video card that runs at 15 WinMarks in WinBench 3.1 (about 8-times SVGA video speeds). Only Maximus delivers so much for so little!

Finally, if you need the very peak in CPU performance, *nothing* beats the Intel 66Mhz version of the 486 CPU. Look at the HD speed you'll get from our 66Mhz Intel systems... call us and we'll show you in person!

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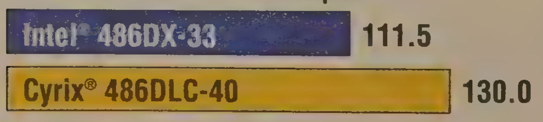
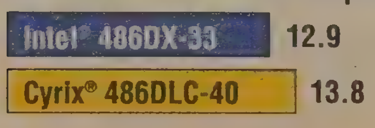
Landmark 2.0 CPU Comparison



WinBench 3.1 Video Comparison



640x480 (tested on the same S3-805 video card)

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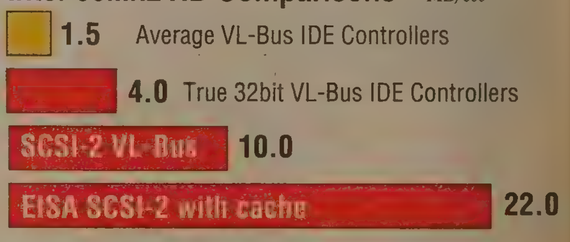
Intel-66Mhz HD Comparisons *MB/sec*



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> If Tandy's prediction of one hundred hours of continuous use holds true, the Zoomer will be an admirable competitor for the HP-100LX and other high-end palmtop machines.

applications include a note pad, date book, address book, bank book, calculator, dictionary, thesaurus, world time, language translator (twenty-six languages with up to a thousand words per language), and others. It includes three games as well, and a reference section for US city and state information, a nutrition guide, US and international dialing codes, and other information references. The Z-550 includes a version of Quicken for keeping track of personal finances, cash expenses, bank transactions, and credit card spending. The machine will include an infrared port for wireless communication with another Z-550. An RS-232 compatible serial port provides information transfer to a PC or other serial device.

The Zoomer uses a special version of the GEOS operating system, which has an open interface that will allow third-party developers to create applications for the machine. The machine will include a single PCMCIA 2.0 card slot, and is based around a custom Intel-compatible CPU chip. The machine includes 1MB of system RAM, 640K for the system heap and 384K for RAM disk space. The built-in applications come to a whopping 4MB, allowing the Z-550 to include a vast amount of built-in information and applications (compared to other palmtop devices). Suggested retail price will be $699, and Tandy slates October as its target ship date.

This machine has very impressive overall specifications. Though it lacks a spreadsheet feature, something I have found to be very useful in my Casio SF-R20, it does have built-in Quicken in ROM, as well as the potential for third-party applications to be downloaded via the serial port. If Tandy's prediction of one hundred hours of continuous use holds true, this machine will be an admirable competitor for the HP-100LX and other high-end palmtop machines.

Casio will also be shipping a Zoomer-series PDA called the XL-7000.

Bigger Gets Smaller

SunDisk Corporation has announced a number of high-capacity PCMCIA-compatible Flash RAM cards, called the SDP series. These cards, compatible with both PCMCIA 1.0 and 2.0 standards, feature 2.5–20MB of non volatile Flash RAM storage.

Unique features of these cards include a 512-byte sector size (the same as a hard disk), hardware remapping of bad areas of the card (down to the bit level for increased longevity of the card), and Stacker compatibility. SunDisk claims that the dynamic error detection and correction algorithms will allow the card to have an operating lifetime of over 100 years of normal use. This is much

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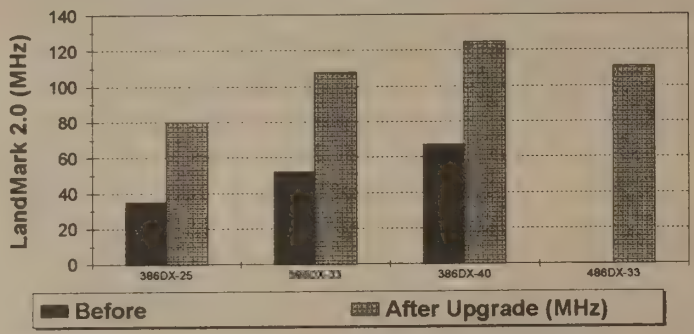

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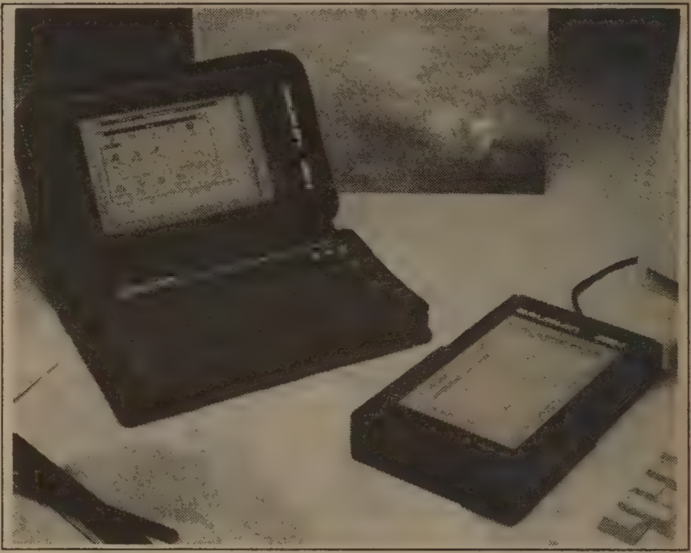
longer than competing Flash RAM cards, which suffer from degradation when information is repeatedly erased and rewritten.

Low-power versions of the cards are available for the HP 95LX and 100LX series palmtop computers, in sizes up to 10MB. The HP-compatible products list for $499 for 5MB and $879 for 10MB capacities. The 15MB and 20MB cards are available only in 12-volt versions (more power than is available in the HP100LX series, but usable in subnotebook and other computers with more available power), for $1199 and $1499 retail, respectively.

Interestingly, SunDisk is also making IDE-compatible Flash Disk drives in both the 2.5" and 1.8" form factors for use in notebook and subnotebook computers. Lighter, faster, and lower in power consumption than traditional hard disk drives, the solid-state IDE-compatible drives are available in sizes up to 40MB in capacity. Tandy has also announced that support for the SunDisk Flash RAM cards will be built into the Zoomer PDAs; thus, no drivers will be required to use SunDisk cards (just "plug and play").



The Dauphin DTR-1 is a subnotebook-sized pen-based computer with a detachable keyboard. Like the GRiD Convertible, it is capable of both keyboard and pen-based use.

IBM has shown prototypes of its Solid State File, which is a similar PCMCIA-based Flash RAM-based filesystem. Unlike the SunDisk card, however, the IBM card is not yet shipping, and the error detection and correction scheme is based on large-sized blocks (32K), unlike the bit-level dynamic error correction present on the SunDisk card, which allows the other card a much longer service lifetime. No prices were available as of press time.

PCMCIA Ethernet

New Media Corporation announced availability of its PCMCIA 2.0-compliant Type I (3.3mm) Ethernet LAN cards. The card features a 64K RAM cache, on-card DMA, 16-bit data transfer, 10BaseT and 10Base 2 interface support, Novell and Windows for Workgroups, NDIS and ODI drivers, and a lifetime warranty. The 10BaseT version is available for $199, and the 10Base2 version, $229.

Chaplet Peripherals has also announced PCMCIA Ethernet adapter cards called (inexplicably) their EgoLAN card. Drivers for Novell, Microsoft LAN Manager, Banyan VINES, Unix (Streams), FTP PC TCP/IP, and NFS (Network File System) are provided. This card is not as thin as the New Media card; it is a Type II card (that means it is 5mm thick). The 10BaseT card is available for $299, and the 10Base 2 version for $319 retail. Chaplet also has a line of PCMCIA RAM cards. ■

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Microsoft At Work Or, Quiet, Please. I'm Talking To My Copier.

BY YACCO

If you haven't yet heard about the Microsoft At Work Architecture, it's probably because you haven't read a business magazine or newspaper recently. Trust me, Microsoft's new architecture for the workplace is getting covered everywhere. And it should be. Something like it will definitely be in your future.

Simply put, Microsoft At Work is a plan to network office equipment. Not just computers, routers and hubs, mind you, but everything in your office, except the stapler and your secretary. You'll eliminate a lot of paper. Not all of it. That isn't the goal, says Gates. But you'll be able to eliminate much of the duplication required to disseminate information once it's received.

LANS

Microsoft is important to this, of course, because something like a workplace architecture needs a leader. Without a standard to bring them together, the hardware players probably wouldn't do it. Each would be more likely to get into all the product lines itself, and push the others out with proprietary protocols. It's unlikely that a group of them could cooperate on its own. And even if giants like IBM succeed in offering a proprietary solution, single-vendor solutions don't make sense for customers anymore. Most would be leery of the benefits. No vendor can do everything best. And no customer could be comfortable giving so much control to one company.

Microsoft's plan is to put many hardware vendors together with a standard. That's still a tall order. Fortunately, with Microsoft behind MAW, there will be a high level of belief in it. And if the industry believes in something, it can work.

Just consider CD-ROM as an example. A few years ago, I was repeatedly rebuffed by editors whenever I proposed writing about CD-ROM. They all claimed that forthcoming read-write optical technology would eclipse it. Users undoubtedly would prefer it to read-only devices, they reasoned. If that had remained the prevalent belief, CD-ROM might have languished. However, Microsoft understood the attraction CD-ROM held for publishers, and pushed it by establishing an industry conference. Publishers, armed with confidence in the technology's future, were able to take advantage of the medium's read-only character to produce electronic publications with which they felt familiar and comfortable. CD-ROM slowly sailed out of the doldrums, built up speed, and flourished. These days, I review juke boxes full of CD-ROMs, and Microsoft's plans are more influential than ever.

MAW AT WORK

Once MAW brings the necessary players together, you'll have more than a network. You'll have more than a choice among various telephone equipment, copier, fax, and other product vendors. You'll also have Windows. This initiative comes from Microsoft, so naturally, MAW is tied to its favorite operating environment. And Windows, or the appropriate portion of it, will for the first time empower users of complex office systems. Microsoft envisions, for instance, a visual point-and-touch interface for complicated telephone services such as transferring, conferencing, and voice mailing. But a new interface isn't the only importance of MAW, even though that's the part on which Microsoft will concentrate.

What's also vital is the physical infrastructure that MAW will create. It's the ports and protocols that will let you connect the telephone, copier, fax, portable handheld devices, and perhaps even the postage meter, to your desktop computer. Once MAW's infrastructure is in place, any software might be able to exercise control through it. And that control need not be limited to today's office equipment. It can extend to new devices that will be defined by this enabling technology. It doesn't have to be an application under Windows either—it can be microcode in a chip.

If MAW follows the evolution of the LAN, it will begin by connecting resources, just as early LANs did, for improved access. The interface itself improves access in a sense. Other computer resources can also be shared with office machines. Why have separate memory for your fax, for instance, when there are always unused bytes somewhere on the network? Formats and fonts will be standardized between devices with the Microsoft At Work rendering portion of the architecture. Microsoft calls it "What You Print Is What You Fax Is What You Copy Is What You See." Documents will be accessible through off-the-shelf applications too.

Eventually, MAW will foment hardware evolution just as LANs have with computer resources. For instance, LAN users have reduced the number of hard disks and printers they need. In the case of MAW, there will no longer be a reason to duplicate all the functionality of your office machines. You won't need both a printer and a copier, which is basically a print engine and a scanner. Digital printers can be adapted to both. And if your digital scanner can then be used for copy functions, there's no reason why you can't also use it for inputting hard copy to your fax machine. Come to think of it, once you eliminate its printer and scanner, the fax is reduced to a modem. Furthermore, given a modem's telephone connection, you should be able to use your multimedia video digitizer for video conferencing applications. Video conferences can also share your multimedia sound system.

In other words, all your communication devices can be separated into their individual functions, and each function redesigned as a module that attaches to the network. The computer's role will be to dynamically configure them as required for the various tasks you do. This isn't part of MAW now, but it could be if vendors redesign these products.

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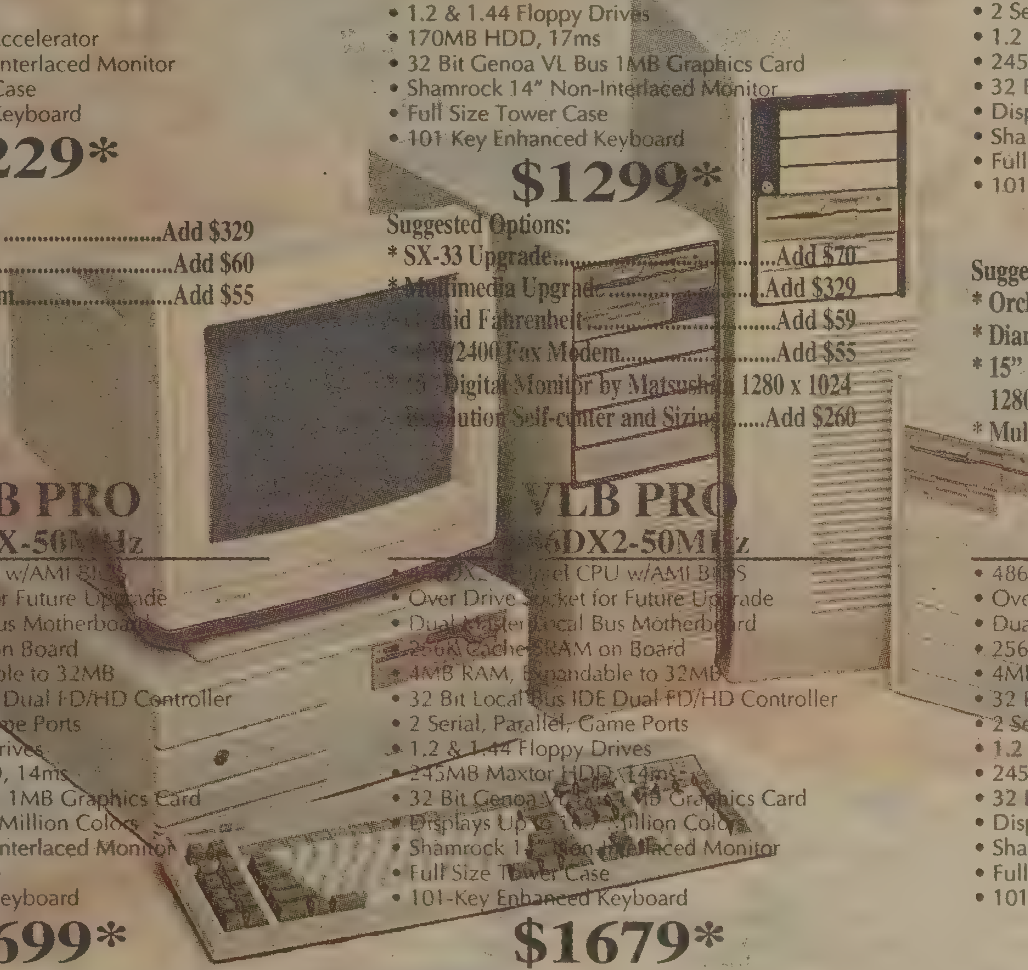

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486DX-33MHz

- 486DLC-33 CPU w/AMI BIOS
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- 4MB RAM, 256K Cache
- Dual FD/HD Controller
- 2 Serial, Parallel, Game Ports
- 1.2 & 1.44 Floppy Drives
- 170MB HDD, 17ms
- Paradise Windows Accelerator
- Shamrock 14" Non-Interlaced Monitor
- Mini Digital Tower Case
- 101-Key Enhanced Keyboard

$1229*

Suggested Options:

* Multimedia Upgrade ....Add $329
* Diamond Speedstar..............................Add $60
* 9600/2400 Fax Modem..........................Add $55

VLB PRO
486SX-25MHz

- 486SX-25 Intel CPU w/AMI BIOS
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- 256K Cache SRAM on Board
- 4MB RAM, 256K Cache
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- 1.2 & 1.44 Floppy Drives
- 170MB HDD, 17ms
- 32 Bit Genoa VL Bus 1MB Graphics Card
- Shamrock 14" Non-Interlaced Monitor
- Full Size Tower Case
- 101 Key Enhanced Keyboard

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Suggested Options:

* SX-33 Upgrade..Add $70
* Multimedia Upgrade ....Add $329
* Orchid Fahrenheit.......................................Add $59
* 9600/2400 Fax Modem..................................Add $55
* 15" Digital Monitor by Matsushita 1280 x 1024
  Resolution Self-center and Sizing......Add $260

VLB PRO
486DX-33MHz

- 486DX-33 Intel CPU w/AMI BIOS
- Over Drive Socket for Future Upgrade
- Dual Master Local Bus Motherboard
- 256K Cache SRAM on Board
- 4MB RAM, Expandable to 32MB
- 32 Bit Local Bus IDE Dual FD/HD Controller
- 2 Serial, Parallel, Game Ports
- 1.2 & 1.44 Floppy Drives
- 245MB Maxtor HDD, 14ms
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- Displays up to 16.7 Million Colors
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- 101 Key Enhanced Keyboard

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* 15" Digital Monitor by Matsushita
  1280 x 1024 Resolution.........................Add $260
* Multimedia Upgrade ....Add $329

VLB PRO
486DX-50MHz

- 486DX-50 Intel CPU w/AMI BIOS
- Over Drive Socket for Future Upgrade
- Dual Master Local Bus Motherboard
- 256K Cache SRAM on Board
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- 32 Bit Local Bus IDE Dual FD/HD Controller
- 2 Serial, Parallel, Game Ports
- 1.2 & 1.44 Floppy Drives
- 245MB Maxtor HDD, 14ms
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- Displays Up to 16.7 Million Colors
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- Full Size Tower Case
- 101 Key Enhanced Keyboard

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* Multimedia Upgrade ....Add $329
* Orchid Fahrenheit ....Add $59

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- Displays Up to 16.7 Million Colors
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- Full Size Tower Case
- 101-Key Enhanced Keyboard

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Suggested Options:

* Diamond Viper VLB w/2MB VRAM..Add $319
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  Resolution, Self-sizing & Centering....Add $260
* Multimedia Upgrade ....Add $329
* Orchid Fahrenheit.................................Add $59

VLB PRO
486DX2-66MHz

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- 256K Cache SRAM on Board
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- 32 Bit Local Bus IDE Dual FD/HD Controller
- 2 Serial, Parallel, Game Ports
- 1.2 & 1.44 Floppy Drives
- 245MB Maxtor HDD, 14ms
- 32 Bit Genoa VL Bus 1MB Graphics Card
- Displays up to 16.7 Million Colors
- Shamrock 14" Non-Interlaced Monitor
- Full Size Tower Case
- 101 Key Enhanced Keyboard

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Suggested Options:

* Diamond Viper VLB w/2MB VRAM..Add $319
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* Multimedia Upgrade ....Add $329
* Orchid Fahrenheit.................................Add $59

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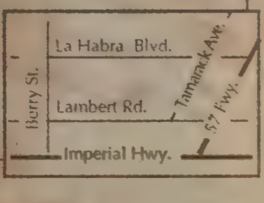

Microsoft envisions, for instance, a visual point-and-touch interface for complicated telephone services such as transferring, conferencing, and voice mailing.

Such changes would, in turn, give rise to new work habits just as conventional LANs have brought about today's new workgroup models. In a system like this, increasing workloads and distributed work points can be handled by adding additional modules. It won't be necessary to add a print engine everywhere you need a scanner for faxing or copying. Most of the remaining print engines can be located for routine, and cost-effective, central distribution. Many intercompany communications can replace paper altogether with email.

BUT WAIT, THERE'S MORE...

This change will produce huge benefits, principally lower equipment and variable costs. But that isn't all. Modular technology will require less space, reduce cooling requirements, and eliminate the pollution that would have been created by elided units. Centralizing intelligence and breaking devices into modules can also raise quality and functionality to uniform levels. For example, sharing a modular print engine will uplift the quality of faxes to that of other office documents. And in terms of computing power and storage requirements, special fax functions such as broadcasting and polling have very modest requirements. On a standalone fax, they require adding memory chips and intelligence at extra cost. On a communication-enabled network, they may only require the software.

In fact, the intelligence for faxing, telephony (including video conferencing), copying, video, sound, compression, and other communication functions can all be put on a network-adapter card and slipped into every PC. Need video input for digitizing images and conferencing? It'll be in there. Need MIDI, voice-, and digital-sound processing? It'll be in there too. And if Intel can put a pair of i486s, a coprocessor, a couple of caches, and all the Pentium's pielining logic into one chip, there's no reason why all this functionality can't also end up in a single communications chip. Like the very first PC networks, Microsoft At Work is just a beginning. ■

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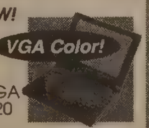

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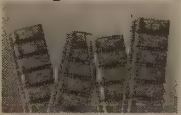

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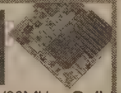

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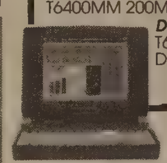

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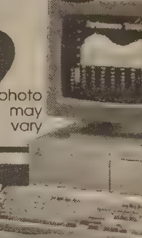

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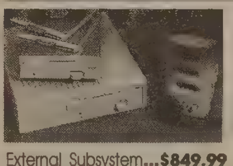

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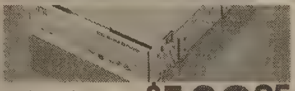

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Telecommuting Spawns New Jobs

Combining Existing Skills And Tools In A New Way, The Technographer Helps To Increase Productivity And Participation In An Organization

BY ROBERT MOSKOWITZ

With some 6.6 million full-time employees accomplishing a regular portion of their work through "telecommuting," it's clear to almost everyone that the principles of telework can be applied to a wide range of existing jobs. What's only now beginning to be noticed, however, is that the advent of telework will itself accelerate the creation of some totally new job descriptions. The one gaining widest acceptance and most clearly worth knowing about right now is the Technographer.

> THE ADVANTAGE TO BECOMING A QUALIFIED TECHNOGRAPHER IS LEARNING HOW TO MAINTAIN ONESELF AS AN EFFECTIVE COMMUNICATIONS CHANNEL AND COORDINATOR FOR THE GROUP WITHOUT TAKING OVER TOO MUCH.

Basically, a technographer is a trained facilitator of the communications and thought processes that take place at meetings. The Technographer's primary tool is a computer with a display screen that everyone in attendance can see.

To understand how a Technographer works, imagine that you're having a telephone conversation with another person and that, to keep track of what is said, you take notes by typing into your computer the ideas expressed and sometimes the exact words spoken. Further imagine that you send a copy of these notes to the other person several times during the conversation. Each time you send the notes, the other person has a chance to modify and verify what you've typed. He or she also has the opportunity to better understand where the conversation has come from, and thus where it is going and what work ought to be done as a result of it.

This note-taking and note-sharing process increases the functionality of the conversation because seeing the information in black-and-white helps people clarify and improve their own thinking about what is being said, and also because both parties can now leave the conversation with the same set of notes and understandings. Technography offers these benefits not just for two-party conversations, but for work-group meetings of almost any size. It allows every participant to see the impact of their individual input and maintain their alignment with what other people have already said.

Large corporations and small businesses are already taking advantage of Technography to improve the effectiveness of their meetings. At Knight-Ridder and Great Western Bank, it's used regularly to facilitate meetings and planning sessions. At Apple Computer, Director of Human Resources for Macintosh products Jim Cutler acts as his own Technographer to facilitate his team's weekly meetings. Ross Perot's firm, EDS, has for years given its meeting facilitators the title "Technographer," and has built several Technography centers that amount to electronic turbochargers for meeting facilitation.

While Technography greatly improves productivity and effectiveness for face-to-face meetings, its real beauty lies in the ability to facilitate teleconferencing, video conferencing, and computer conferencing—the exact types of remote meetings that routinely take place when some of the people in an organization telecommute. Instead of throwing the notes and ideas up on a single screen where people at one meeting site can see them, a Technographer can use relatively simple, proven technology to display the meat of the meeting on video screens at two, three, or more sites, helping people at any one location make a closer connection with the people at the other sites. For telecommuters' telephone conversations, a simple fax of the notes several times during the conversation serves the same purpose. Technography becomes the next best thing to being there because it greatly improves the immediacy of the meeting for people who happen to occupy different locations.

Technography is so well established as a job description for the telecommuting age that the Institute for Better Meetings, based in Palo Alto, CA, has begun to offer a two-day certification program in this new set of

continued on page 43

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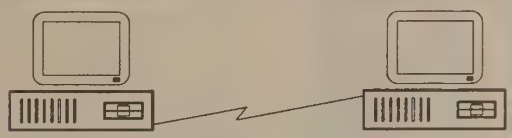

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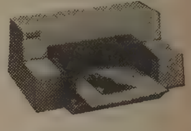

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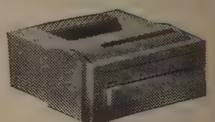

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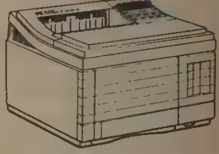

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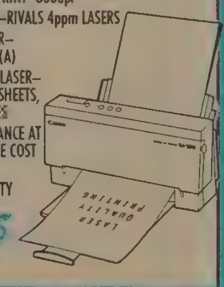

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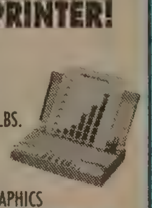

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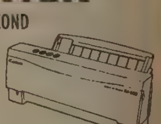

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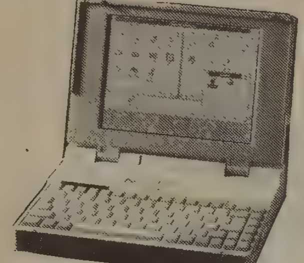

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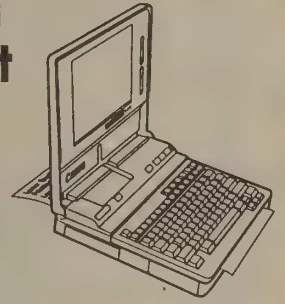

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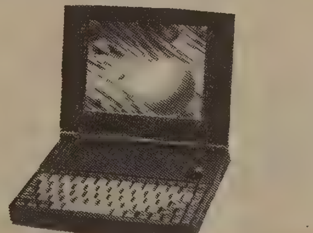

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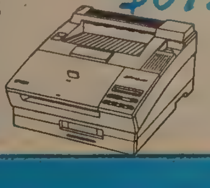

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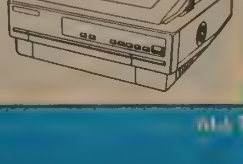

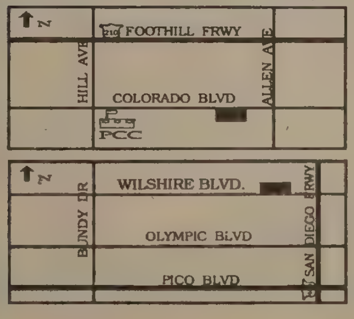

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skills. It's even possible to become a bilingual Technographer.

According to Bernard DeKoven, a seminar leader and consultant at the Institute, the developer of the Meeting Meter software, author of *Connected Executives*, and an expert on the collaborative process for business executives, the real advantage of becoming a qualified Technographer is learning how to maintain oneself as an effective communications channel and coordinator for the group without taking over too much (a problem even for people working a chalkboard in front of a group).

"You must learn how to play a certain role in the group and facilitate the group process without dominating it," says DeKoven, "which is why the role of Technographer should rotate within the group, just as in ancient times people would take turns acting as scribe or timekeeper for a certain part of a meeting in order to facilitate progress for everyone."

If the Technographer—or anyone controlling the notes and the feedback process in the meeting—records the ideas that people express without using their exact words, DeKoven explains, people quickly lose ownership and interest in the meeting. It's far better for the Technographer to keep asking questions, on the order of: What should I type now? Do you want me to change it? Do you like it better this way, or that way?

Repeatedly asking these questions makes people in the meeting—those directly in the room as well as telecommuters or others connected electronically from remote locations—think more carefully about what is being said, and why. Sometimes, of course, it's appropriate just to have a conversation where people exchange ideas. But when people meet or talk with a clear purpose, it's also appropriate to shift into a different mode, a work mode in which people commit their ideas to writing. Creating such a document is not the ultimate purpose of the meeting, of course, but it becomes the tool to support and corroborate the communications, the decisions reached in the meeting, and the action items to follow.

"In terms of collaborative process," says DeKoven, "Technography is a powerful facilitative intervention." As people grow more comfortable having a Technographer around, he or she can become far less visible or intrusive. People quickly learn how to get their ideas up on the screen, and how to work with what else is up there. They become skillful at conducting Technography-based discussions, working from the screen or printed notes and controlling the process. It turns out that people need very little exposure and training to make good use of Technography for face-to-face meetings or for electronic ones.

Learning how to function as a Technographer, in turn, helps individuals contribute more to the group process. For one thing, temporarily functioning as the group's Technographer gives each person a chance to share with the group how he or she uses the computer. It effectively converts your personal screen into a team screen. For example: you may elect to use the Table Tool in Microsoft Word, or a table made within a spreadsheet to show the pros and cons of a particular plan of action or item of dis-

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agreement. As everyone contributes to the drafting and subsequent rewording of the pros and cons, people who fundamentally disagree subtly shift into a collaborative mode, and begin cooperating to define the basis of their disagreement. From there, it's often a relatively short step toward collaboratively developing a compromise solution that people on all sides can support.

Technography began as a tool for dealing with words, but it works equally well in dealing with numbers, calculations, and data analysis—in fact, for any work that can be accomplished in a meeting. By shifting from a word processor or text outliner to a spreadsheet, for example, the Technographer can help participants create a business model, refine a financial analysis, or do collective "what if"-ing in support of their decision-making process. By shifting to a project-management tool, the Technographer can help the group organize how they and their subordinates are going to work together toward a common goal, how they are going to utilize and share resources, and when and how they are going to schedule their time and efforts to maximize the collective group output. By working with a data manager and a database of business information, the Technographer can provide immediate answers to basic questions, and help focus discussion on concrete facts rather than speculation.

In fact, Technography is proving itself an effective means for improving the total flow of information throughout any work group, particularly when telecommuters are involved. Through Technography, electronic participation in a meeting is not the usual arm's length challenge. Each person leaving a Technography-supported meeting can go back to his or her desk with all the documents, analyses, and projections created there, ready to evolve them further individually. These refinements can be quickly and frequently communicated with others through email, file sharing, or facsimile, setting the stage for relatively rapid progress at the next face-to-face meeting.

Traditional meetings tend to be very isolated because people fall out of touch, and forget a great deal of the detail from one meeting to another. But keeping the ideas alive via intra-group communications makes each face-to-face meeting clearly a continuation of the work process. As before, people take up at one meeting where they left off at the last, but now they have several new streams of information to weave the two meetings together.

According to DeKoven, the live face-to-face meeting is quickly becoming surrounded and supported by a variety of communications experiences, including contact with telecommuters from remote locations. This gives such meetings a special importance above and beyond the need to pass along information or agree on a course of action. In today's environment, face-to-face meetings are focusing more on the unique things people can accomplish in a live encounter that they can't do over electronic connections, such as: develop and deepen the connections and the trust so necessary for ongoing collaboration, and understand and appreciate the differences and specialties that each brings to the work group.

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Although computer-assisted Technography is a powerful method of enhancing both live and electronic meetings, it is equally important to know when to turn off the computer screen. Temporarily freezing the system helps validate that the communications process is shifting from "on the record" to "off the record," from concrete formulations to blue sky thinking, and so forth. While the Technographer should not be the one to initiate such a shift, his or her recognition that the shift has taken place lends extra freedom to speculate at certain times, and extra meaning to the work accomplished when participants come back "on the record."

There tends to be three phases of results-oriented meeting activity where adding Technography improves productivity and impact—phases that DeKoven calls "Collect, Connect, and Correct." In the first or "connect" phase, people contribute a great many ideas regarding a problem and/or possible solutions. Technography provides a very powerful tool for recording the many fleeting ideas that may be rapidly expressed. In the second or "connect" phase, meeting participants begin making connections between the previously listed ideas—organizing and categorizing them in what should be a collaborative process. Here, Technography harnesses the power of computers to re-sort and redisplay information with minimum effort. And by creating a display visible to everyone, including telecommuters and teleconferencers at other sites who are attending the meeting via voice and electronic data links, it enhances the potential for collaboration and consensus. In the third or "correct" phase, meeting participants refine and polish the raw ideas. Here, Technography gives everyone an opportunity to offer changes to the group, not only facilitating the refinement process but helping everyone "buy-in" to the final results.

In a remarkable synergy, telecommuting is not only offering solutions to problems associated with more traditional patterns of work, it is supporting a whole new range of technologies and techniques—including new skills like Technography and underrated supervisory styles like management-by-objectives—that can be applied to telecommuters and nontelecommuters alike in a bid to increase the productivity and participation of everyone in the organization. ■

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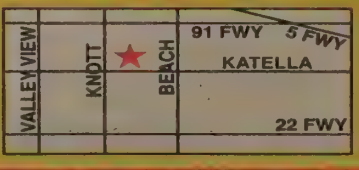

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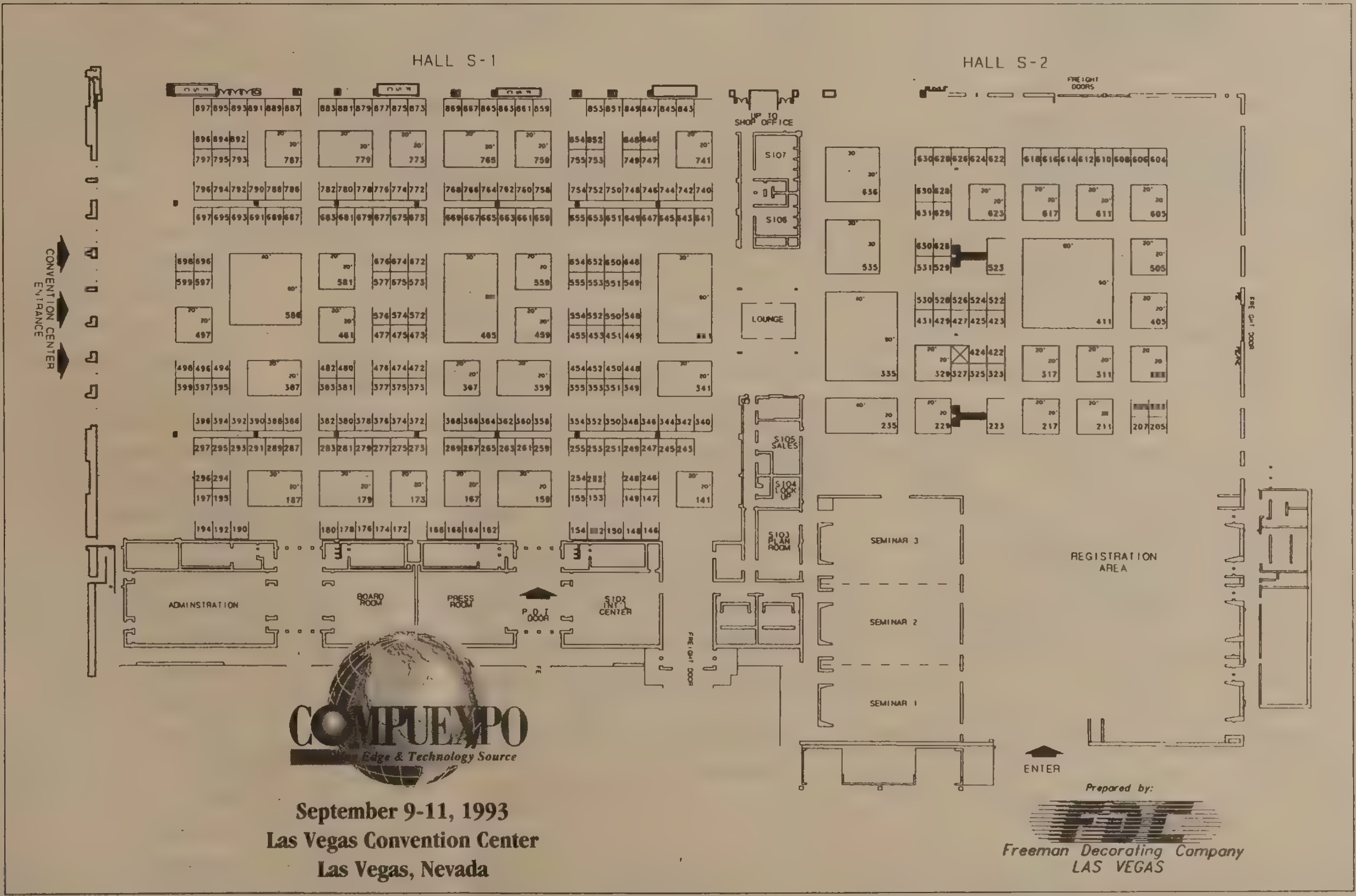
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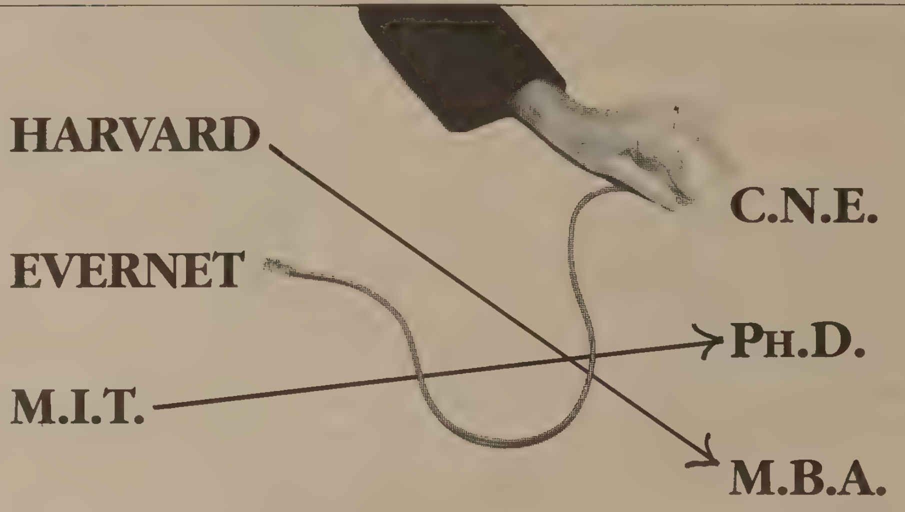
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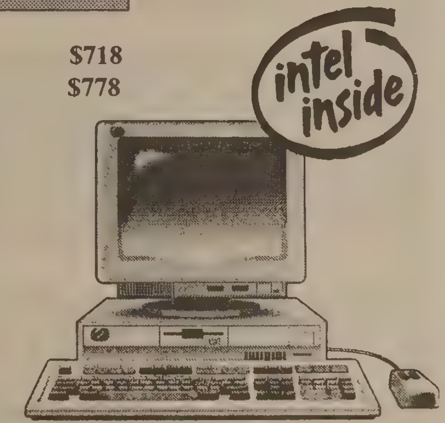

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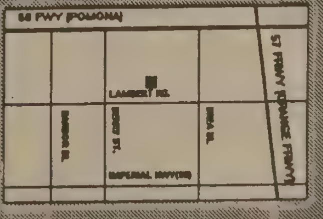

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(As of 7/27/93)

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9:30–10:30 am
KEYNOTE - TBA, Intel Corporation

10:45 am–12 noon
Energy-Efficient PCs—An Opportunity You Cannot Afford To Miss
William C. Jackson, Chair*, President & CEO, Technology Marketing Partners*
How to take advantage of the rapid transition to "green" PCs. An ideal reseller opportunity.

Panelists include:
Brian Johnson, Director, Energy Star Program, EPA
Bruce Campbell, VP, Sales & Marketing, PicoPower Technology
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Representative TBA, Government Services Administration (GSA)
Darwin Chen, Vice President, ECS

12:15–1:30 pm
Direct Sourcing From Asia
Kuo Yun, Chair*, Chairman, Institute for Information Industry*
How to do business directly with high-volume, price-aggressive companies in the Pacific Rim.

Panelists include:
Representatives from ACER, FIC, Mitac, Compac, Sun Moon Star

1:45–3 pm
Fifty-Three Ways to Improve Sales, Reduce Costs, and Just Make More Money
Stan Rosenzweig, President*, Office Technology Consult. Inc.*
This audience participation seminar will cover the good, the bad and the ugly in today's selling environment. It will improve your direct mail response, tighten your telemarketing presentations, shorten your selling cycle and teach you how to build a better marketing machine with less wasted effort. Mr. Rosenzweig is an award winning sales and marketing contributing editor of *Reseller Management Magazine*.

continued on page 100

"In A League By Itself..."

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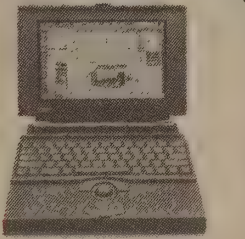

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IRON HELIX MAC CD-ROM

Photos: Michael Jay (Gilman Louie); courtesy of Spectrum HoloByte (screens)

ious Fun

AN INTERVIEW WITH GILMAN LOUIE

By
Mary
Eisenhart

"My new residence is the airplane," sighs Spectrum HoloByte Chairman Gilman Louie, newly returned from conferring with some virtual reality-arcade associates in the UK. Only a few days before, he'd been at the Technologic Partners Interact conference, regaling venture capitalists and other interested bystanders with charts showing the company's massive inroads into the Sega-Nintendo market, its recent acquisition of Bulletproof Software (purveyor of cartridge classic Yoshi's Cookies) and its current negotiations to acquire longtime flight-simulation rival Microprose, and its far-reaching alliance with Paramount to develop Star Trek: Next Generation products from 3DO games to total-immersion virtual reality parlors.

Louie's life has been anything but restful since at least 1982, when he and a bunch of his SF State fraternity brothers graduated, found themselves unemployed, and decided to go into business writing computer games. They called the company Nexa and set up shop on his parents' kitchen table.

"Nexa was a development house," says Louie. "We developed most of our games for the Atari, the Commodore 64, the Apple II, and did a lot of work with the Japanese, specifically for Ascii Microsoft of Japan on the MSX computer.

"We had developed this game called F-16 Fighting Falcon for the Japanese market. And Paul Saffo, who's a friend of mine, and kind of an advisor, showed it to Stewart Alsop and told Stewart we should get this Colorado publisher and this San Francisco developer together because this should be on American computers."

"This Colorado publisher" was Spectrum HoloByte, which was enjoying great success with its WWII submarine simulation Gato. "So in '85," Louie continues, "we had a contract to develop Falcon for the Macintosh and the PC. In 1986, as a developer I found out that Spectrum HoloByte was looking to raise capital or sell itself to a big publisher. They were talking to two companies primarily—Mindscape and Activision.

"And I said, 'I don't think you want to do that,'" he laughs. 'Maybe we should just write a joint business plan. And if you want to do it afterwards, fine. But if we fill out this business plan maybe there's an opportunity, because there's never been a real good developer merging with a real good publisher to form an all-underneath-one-umbrella scenario to run a software company—come up with the ideas, build it, market, and sell it.'"

So the two companies put together a plan, showed it to a lot of people, and after assorted interesting experiences ("We didn't know how good this business plan really was until somebody told us they were willing to pay us a quarter million dollars to lose it!" Louie recalls gleefully) found themselves talking to Kevin Maxwell, son of Robert.

"It was kind of an interesting day," he says, "because Kevin's wife was having their second child, giving birth *that moment.* So on July Fourth, he's meeting with me, he gets a telephone call, he has to cut the meeting short because he has to run off to the hospital.

"The next day Kevin calls back and says he wants to do the deal, and that he would buy Spectrum HoloByte and buy Nexa merge the two together, put [Spectrum cofounder Phil Adam] and myself in charge, I as the CEO and Phil as the president; call it Sphere Inc.; and finance up to $8 million in lines of credit to get this company going.

"Over a period of the next four to five years, the company started its rapid growth. Lots of good stories, lots of bad stories in there." Among the good stories was the company's decision to augment its

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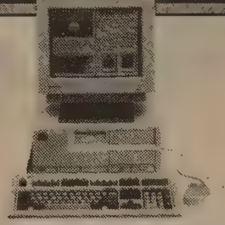

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"Today's users are much more sophisticated. A lot of it has to do with the power of these machines—even the Super Nintendo and Genesis boxes are relatively powerful. The Genesis is as powerful as the first Macintosh to hit the marketplace."

line of flight simulators with an unknown Russian product called Tetris. But things didn't go exactly as planned, largely because the Maxwell empire didn't really know what to do with an entertainment software company. Sphere rolled around the org chart, at one time finding itself reporting to MTV Europe. "That was okay," Louie explains, "because there finally were some executives who understood what we were trying to build. We came up with this business plan of growth in the cartridge business, and acquisitions, and a variety of other things.

"Before we could implement the plan, of course," he continues, "Robert Maxwell fell off the boat. And he took everybody with him.

Months of chaos ensued as Louie and concerned would-be investors tried to extricate the company from the Maxwell debacle, a process complicated by the fact that, as Louie puts it, "It took us eight months to figure out who really owned us." Finally, last year a group including VCs Kleiner Perkins Caufield and Byers, Silicon Graphics chairman and founder Jim Clark, as well as AT&T and Stanford University, managed to buy controlling interest and reestablish Spectrum HoloByte as a private company. Another interesting investor these days is Paramount.

We took advantage of a moment of relative tranquillity to check in on current developments.

You've got a pretty diverse group of investors—AT&T and Jim Clark and Kleiner Perkins and Paramount... So what is the plan that these guys all fit into?

I think the view is that computer/cartridge, interactive entertainment going into the home is a rapidly growing industry. It's going to go from five billion, where it is about now, to fifteen or twenty, depending on who you talk to, over the next few years.

And this technology we're building has a lot of elements in other people's markets. AT&T is very interested because they see themselves as a global provider of telephone communications, and this consumer part of the business is very interesting to them. They perceive that entertainment really pushes the edge of the hardware, and they can take that and grow a great consumer business out of it, as well as the spinoff technologies.

Paramount was interested in that their business is basically flat—the movie business is flat, the rental business is flat. They see interactivity as the next great thing. They know from their previous experience at Simon and Schuster Software Division that this is a business that you can lose a lot of money in, so it probably would be cheaper to back a smaller company financially, learn from that smaller company, and if it's really, really successful, maybe buy them or work out joint ventures with them. This was a low-cost way to invest in a technology company and learn a lot about this business. So that's why Paramount came in.

Kleiner Perkins are investors in 3DO and Crystal Dynamics as well as ourselves. Historically they were involved with Electronic Arts, and they said, "Hey, we did EA under the distribution model; I wonder if there's a publishing model, a development/publishing model that a software company can be built under?" and decided to invest in us.

And of course Jim is building his little box that will hook up to cable and television, so he's very interested in this area.

I think everybody else in the past six months got into investing in us because of the big media push—as you can see in the last six or seven weeks, all the covers and stories being run by all the major magazines on *Interactivity!* [*laughs*] They said, "What's the best example of interactivity? Computer games!" That's how they all arrived at this particular point.

As one of the relatively few companies to have survived the first home computing boom and gotten to this point, what's different and what's the same?

What's different is that the expectation of quality in the software is much higher today. The users are much more sophisticated. A lot of it has to do with the power of these machines—even the Super Nintendo and Genesis boxes are relatively powerful. The Genesis is as powerful as the first Macintosh to hit the marketplace.

The second difference is that there's a lot more diversity in the kinds of titles that are being published today than there was ten years ago. In the Atari days, the 2600 days, all the games looked exactly the same because you could only do so much with 2K of memory and a really bad processor. They did amazing things, but after a while they all began to look the same, and people lost interest. It was a fad. It wasn't a good vehicle of expressing an artistic or creative work. Whereas today's machines are getting much more close to that final thing that will eventually look like an interactive TV box.

Finally, there's a lot more money involved. There's a lot more technology being put together. In the Atari days, the Atari was just sitting by itself on top of a television. There were no other technologies on the horizon that were going to play a role with that box. The Commodore 64 and the Apple II were kind of computers who couldn't make up their mind whether they should be a game machine or not; it just so happened that a lot of people played games on them, but they were trying to sell themselves as computers. Because of that, there was a real hobbyist following, but not a real big consumer following.

Now it's very much a consumer business. It's very much toys, it is very much kinds of entertainment. Public relations activities that you'll find for movies, you'll find them now in games. Sonic Tuesday was huge, not just here in the United States, but in Europe as well. It had coverage better than most major movies rolling out the door, because now there is a whole group of kids who are now getting older, who are still carrying these machines with them.

There's another generation of hardware about to come out, and that next generation of hardware is really going to change the way we think about computer entertainment.

Does that include 3DO, for instance?

Yes.

In real-people terms, what does 3DO provide that hasn't been there before?

Well, I think 3DO is the first machine that crosses what we call the minimum threshold of having real high-quality graphics and animation capability—if you blur your eyes just a tad bit, like if I take off my glasses, it actually looks close to video, in the

"Prior to 3DO, unless you had a really high-end 486, it was impossible to create high-quality synthetic stories, because the machines just were not powerful enough. You couldn't push enough pixels to the screen, you didn't have the horsepower to generate the logic. The Nintendo and Sega boxes are like bad cartoons at best."

"All those hardware suppliers are going to need good software to promote their boxes. There's going to be a real boom for software developers and publishers to provide cutting-edge software—stories, simulations, puzzles, games—that can be used by all these hardware manufacturers."

types of images and what you can manipulate with those images, because it's all in 3-D. You can create synthetic stories.

Prior to 3DO, unless you had a really high-end 486, it was impossible to create high-quality synthetic stories, because the machines just were not powerful enough. You couldn't push enough pixels to the screen, you didn't have the horsepower to generate the logic. The Nintendo and Sega boxes are like bad cartoons at best. At their best, they're at the lowest quality of bad cartoons.

3DO changes that by allowing us to use video images, and 3-D objects with texture maps, so that we can create worlds that you can walk around in and be fully interactive with. Not something that you prerecord on a CD—like CD-I, where you can send a guy out with a film team to record all this stuff, and you play it on a CD, and just because you go left down a corridor versus going right down a corridor, that's "interactivity." That's all canned. If somebody had to film it ahead of time, it's not very interactive.

But if you can make it yourself as you go along, it's a lot better.

Exactly right.

But 3DO won't be the only machine that's going to be out there. There are other companies. Everybody's waiting for what the 32-bit Sega machine is going to be, the 32-bit Nintendo machine; Sony's rumored to be working on a machine. Jim Clark's new hot box...

They all have the same basic characteristics—3-D capability, 3-D texture mapping, highly powerful RISC processor, good sound capability, mass storage, and something to hook up to the outside world with, either through the telephone or through a cable wire.

That will become the focus of attention: how all this kind of electronic media interactivity that starts coming together will be through one of those boxes. Whose name's going to be on the box is anybody's guess, but it will be very, very exciting.

And I think the software companies stand to gain a lot, because at the end of the day all those hardware suppliers are going to need good software to promote their boxes. There's going to be a real boom for software developers and publishers to provide cutting-edge software—stories, simulations, puzzles, games—that can be used by all these hardware manufacturers.

What can software developers do in this new world that they couldn't do before? What becomes possible for users that they couldn't do before?

I'll give you a good example. Say if we were to do a Batman game. We don't have rights to that, but hypothetically. The traditional way you do Batman as a movie or a comic book is you start from point A, and you go linearly all the way through to the end. Every scene is shot, every scene is played through, and the player just watches it passively.

Computer games aren't much different from that. The Sierra On-line games, the Lucasfilm games, Microprose's Graphics Adventure games, are identical, with the exception that they have branching points, where instead of going left you can go right; instead of killing somebody you can choose not to kill somebody.

A writer actually writes out all the possible places that you can journey to, and what sequence you're going to go in. The only thing you do is kind of navigate down that freeway, taking off-ramps into other on-ramps, and branching. But eventually you only have so many possibilities, and most of the time you spend playing these games is finding out what the writer is trying to reveal to you, what the game is trying to reveal to you; or trying to guess locations, or trying to guess the parser. It's guess my location, guess my parser, guess what I should be doing based on what the writer wants me to do.

This new medium allows us to create something totally different. It allows us to create synthetic stories. Instead of doing that with Batman—where we'd have a script where Batman encounters some evil person, like the Riddler, and the Riddler sets up all these traps and Batman is the player, and as you drive down the street you fall into one of the traps, and the only way to get out of the trap is to hit button A or hit button B—we now engineer Gotham City in 3-D. We can actually create the whole city so you can walk around in that city.

We have enough computer horsepower to program the personality profile of each one of the characters you may meet. You have synthetic personalities—the Riddler, the Penguin, the mayor, and all those folks. The writer now, instead of writing a script, writes goals for each one of those individual characters. The Penguin's goal, maybe, is to kill Batman. The Riddler's goal may be to rob the bank. Everybody has their own motives in this world, and the player is injected into this world, much like SimCity. You experience, based on your actions and the characters' interactions with each other, the story as it creates itself on the fly.

On top of that, what's amazing is if you think that you can have algorithms driving all the other characters, you can have algorithms also driving your character. So in effect, you can have selective interactivity. A player can literally put Batman into the game, have the computer play Batman, and watch it like a television show. Or, at any point, interact with that character—"No, don't go there, I want you to go deal with the Riddler, and then let the algorithm take over again." Or, the 8-year-old son or daughter grabs the joystick and starts playing Batman totally.

And people on the network can also be interjected in the same world, so across your telephone lines somebody else can replace the synthetic personality.

This person can be the Riddler and this person can be the Penguin...

Exactly. So now you're creating environments. You're creating the cyber-environment where people can actually come and play. We're no longer writing stories per se, we're actually engineering worlds. We're actually architecting places and rules that people can play in. They can play with computer characters, they can play it with other characters, or they can watch it like television. You could never, ever do that before. There just wasn't enough horsepower in the box.

Even with 3DO, it's going to be difficult, because as powerful as 3DO is, it just barely crosses that minimum threshold of power.

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Exactly right.

It's an exciting time for all of us. Just like that 128K Mac that changed the way we perceived user interfaces and personal computing, I think 3DO will change the way we look at entertainment boxes on top of the TV.

Further out, you've been talking about Star Trek: Next Generation VR parlors.

Yes.

Where does that stand? Obviously it's a little further out on the horizon than 3DO is.

The nice thing about working on a Star Trek VR project is the fact that we don't have to worry about creating software for a $500 box. [*laughs*] Because we can have a lot more dollars that we can invest in capitalizing one of these facilities, we can use much more powerful computers. So we're using [Silicon Graphics] Reality Engines, Onyx engines, to generate all the graphics for Star Trek centers.

The basic idea is, we want a person, when they walk into one of these Star Trek centers, to believe that they're in the Star Trek world. From the moment of entry, we want the person to believe that they're there.

We want them to experience the fantasy. And the Reality Engines give us unbelievable power to create worlds that look totally real.

So the deal is, we're going to mix a variety of technologies together in this entertainment facility—simulation technology, where you climb into a cabin, except this cabin would be a shuttlecraft. We will use helmet-mounted VR display systems for the transporter room or the holodeck. We'll build real facilities like the bridge of the Enterprise where players can go, and as you walk on board the bridge, hit the buttons and make it work.

And having all these players play together with each other on scenarios that are entertaining—it's a human experience, it's not a computer experience. You just happen to be playing through the Silicon Graphics machines, but it's really about people playing with other people and getting to know each other. Eventually if we're successful, we're hoping that there'll be multiple sites that will be able to connect across networks so people can have remote locations.

It's just in its early stage of development. A lot of this stuff is top secret, because we think you want to demonstrate VR not by talking about it but just by doing it.

I think virtual reality, even though it's in its infancy today, will have very amazing kinds of applications, both in entertainment and professional use, and in communications down the road. I think a lot of the pioneering work is being done in entertainment.

The VR parlors are starting to sprout in shopping malls, and so far they seem to be pretty restricted to just shooting the other guy.

Well, you have a bunch of male engineers building games. So we build the games that appeal to male engineers! [*laughs*] Who've been working too many hours in front of their computers....

I think as you get people involved in these kinds of experiences—you'll see the difference between a mechanical experience, or a computer experience, where you're up against an airplane and you're shooting an airplane down, or you're trying to blow up a Klingon ship, and the experience of realizing that now you're working with other people. Or against other people. Both cooperatively and competitively.

And that human experience can create all sorts of wonderful products. You can create adventures, you can go back in historical times—it does not have to be grab a gun, point it at a person, and squeeze the trigger. It could be Alice in Wonderland. There's lots of ideas floating around out there about great virtual reality applications.

On the other hand, there's some basic games that need to come out in the beginning to kind of get the market interested in it. The first game in the video business was Pong.

Actually the first game before Pong was Computer Space, but Computer Space was too complex and nobody could figure out how to use it. Now today, it seems very simple—I have a Computer Space machine up in my house—but when Nolan [Bushnell, founder of Atari] put that machine together, it was too complicated. It was like two flying saucers and a little rocket ship, and you had gravity and thrust. You could rotate the ship around using thrust and momentum to shoot a radio-controlled bullet, which was a little white dot, at these little flying saucers going back and forth on the screen. Nobody could figure it out. It was beyond their frame of reference.

So he created a simpler game—Pong. Okay, now everybody could understand that.

So then Breakout came out, and...

And then it got more and more sophisticated. VR will be the same way. The first games need to be very Pong-like. They need to be things that people can easily understand, and then very quickly get into much more sophisticated kinds of applications.

At the end of the day we're hoping that all the VR technology that we're putting to work now will find its way into the home, because every three or four years it's an order of magnitude change in computer power and price. All the stuff we're working on today will find its way into the home.

If Jim gets it the way he wants it to be, it *will* be in everybody's home in Silicon Graphics boxes.

So it's an exciting time. We get to play with tomorrow's technologies today, and get ahead of that learning curve.

The whole Nintendo-Sega stuff is somewhat outside the parameters of what we usually talk about, and I was a little surprised to hear you say the other day that that's now a majority of your business.

Yes, it is. This year is our first real big year into the cartridge business.

The floppy disk market, the computer/PC market, is still growing very well. It's growing at a 10–15% pace in entertainment software. The problem is that it's a $400 million marketplace, wholesale dollars, versus retail dollars, $5 billion, in the cartridge market. Because of that, the emphasis today in the growth of an entertainment company will be in these cartridge technologies.

The problem with the cartridge technologies is it's only going to be around for a short period of time, just like the Atari machines. They're too expensive, the cost of goods is too high, they don't have a whole lot of capacity. They have one brilliant feature, and that's the ability to plug and play. Put the cartridge in, push the button, and you're up and playing. You don't have to screw around with DOS, you don't have to figure out how to load and unload it, whether you've got enough RAM, if you have the right memory configuration, did you boot under the right operating system—you don't have to worry about any of that.

But the next generation of technology, the mass storage technologies—some people believe it's CD-ROM, others believe it's magneto-optical, other people believe it's new forms of silicon. Whatever that storage medium is, when you increase the amount of storage capacity as well as increase the horsepower of these home-based machines, these games begin now to start looking like personal computer games. Many people believe that personal computer companies have an edge over cartridge-only companies in the next generation of hardware, because we are more experienced at telling long stories, building big simulations—

Getting beyond Super Mario Brothers.

Well beyond Super Mario Brothers. And so the cartridge companies now, Nintendo and Sega, are courting traditional floppy-disk computer software houses, to support new platforms.

We see it all merging together, but the business in and of itself will look much more like the cartridge business than it will look like the floppy disk business. The majority of titles won't be sold at Eggheads, they will be sold at places like Toys R Us and K Mart, WalMart. On the other hand, what you buy will end up being much more sophisticated, much more PC-like than cartridge-like.

Cartridge games will do well for that particular young audience. The reason why adults don't play too many cartridge games is because fundamentally these games are boring. They're great for kids, because kids like to do things over and over again. A three-year-old child drops a fork off the table; you put it back on the table and he knocks it off again. He does this about a dozen times, with great entertaining value to him. Adults don't like doing that—once they do it once they don't want to do it again.

So we think that the software companies that have been focusing on computers will make a better transition to the next new media. But the reality is, today's business is cartridge business. The difference in volume is about four to one per title. With exceptions—a Falcon 3.0 will sell as much as a cartridge title would out in the open market. But even a hit title in the floppy disk market is a quarter million copies. [Cartridge game] Street Fighter II sold nine million copies worldwide. We see an order of magnitude difference between a successful cartridge game and a floppy disk game. But we'll continue to support the floppy disk market. We'll still have about 50% of our internal development focusing on floppy disk titles, and the rest should be in cartridges or CD-ROM titles for the next generation.

Do you feel constrained by the amount of money people are willing to spend for a game

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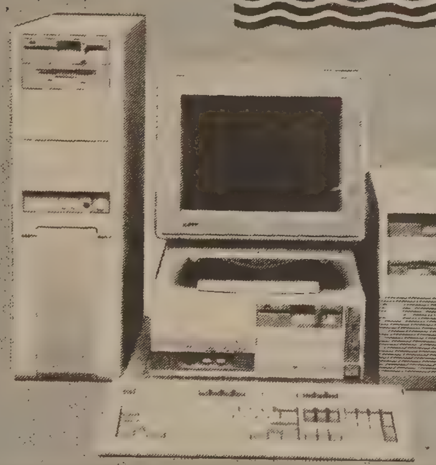

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title, in terms of how many resources you can put into development?

Not so much as that—what we can put into a particular game is determined by the margin.

The problem though, today, until we get to CD-ROMs, is that the cost of goods is rising very quickly. If you have a ten-disk game, it's going to cost you about $10 to manufacture that product, before you think about royalties or the cost of actually developing the game, which could cost $2 or $3 million, typically. So you have to be a lot smarter about placing your bets, and it restricts the number of titles you can do at any one time. Companies that try to do too many, by reducing down the cost of their titles, not getting good quality games on the market, are really hurting right now, because nobody wants to buy their games. CD-ROM will change all that. CD-ROM will mean cost of goods will be down to $2 or $3 dollars for a particular game.

And you can get a lot more on them.

You can get tons more. So we're all looking forward to those days. To give you an idea what the cost of goods on a cartridge is, it costs us $20 to manufacture one Super Nintendo or Sega game.

So the margins are really, really bad.

Really, really bad. You have to have volume to sell them.

Speaking of CD-ROMs, what's this new release Iron Helix?

I like that product. You navigate around the space station; with a lot of CD games you have to wait as you go from place to place, but you don't have to do that with this game—it's continuous, so as you're walking down the halls, it feels like you're walking down the hall. And it's a great story.

The Drew Pictures guys [developers of Iron Helix] are good. They were going to sign with EA. I called them up one Sunday, "Don't sign with EA! Sign with me tomorrow!"

So what's the deal with Microprose?

Well, we announced our intent to acquire Microprose, and the merger agreement has been signed. It now has to go to a shareholder vote and a proxy, and the SEC has to review it, and they have to go through all of that work, which hopefully will be completed by the beginning of October.

[Microprose cofounder] Bill Stealey and myself had talked about this two and a half years ago—the general idea Bill and I had was that today in order to create great games, you need lots of capital, and talent is hard to find. One way to grow a business is by picking all the smartest and brightest people and merging them together under one umbrella company. In that way, we can be strong in many different areas rather than only one or two different areas.

The only problem was, Microprose had to go public because it kind of ran out of cash, and wasn't able to wait around to implement this. It's not the reason to go public, by the way. If you ever find yourself in that situation, that is a very bad situation, to have to go public. Put your house up for your third mortgage or whatever, but don't go public simply because you just need cash, or you're going to go out of business. Because it's going to be more problems than it's worth.

Our view was that there was an opportunity the last couple of months to get together with Microprose and continue in that vision. Here's an opportunity for Spectrum to strengthen its flight simulation lines, so that now we can actually do the electronic battlefield series—

Have all their planes fighting all your planes—

All their planes fighting all my planes, running across a network. They have a great storytelling system called the Advanced Graphics Adventure Group that can tell stories in a more traditional kind of way, and we're doing this cutting-edge synthetic story, so we're merging those two groups together. In a very quick stroke of the pen, we grow our business from kind of a small second-tier company into a very large first-tier company, and have the quality of people necessary to create the next great games for the next generation of hardware, and have all those people working together under one umbrella company.

Are you going to move their people out here?

No. Our view is that companies are creative by nature, and if you put them all under one roof, everybody adopts the same culture and you lose that creativity. It's much better to have satellite operations, independent sources of people with their own personality profiles creating their own kinds of games. Exchange lots of information, cross-fertilize with

continued on page 76

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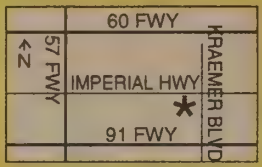

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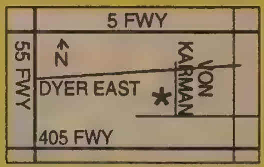

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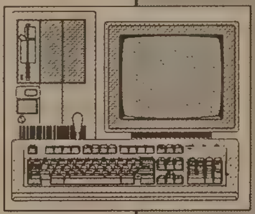

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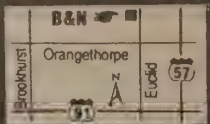

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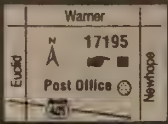

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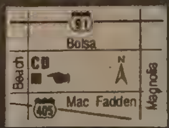

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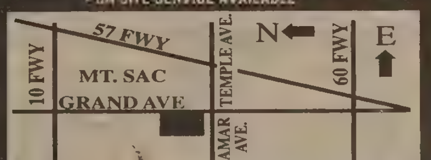

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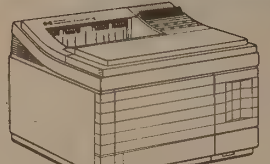

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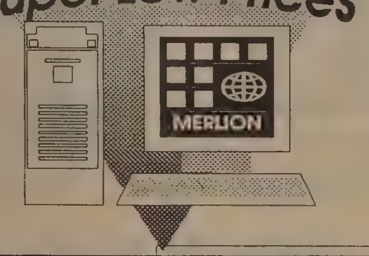

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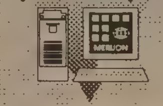
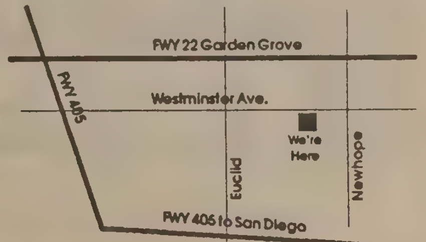


- 256K Cache Memory
- Zero MB RAM (Upgrade to 32)
- TEAC 1.2 & 1.44 FDD
- 245MB Hard Drive
- VESA 32 Bit Graphic Card (1MB)
- SVGA Monitor (.28dp)
- VESA 32 IDE Controller
- 101 Enhanced Keyboard
- Mid-Tower Case
- 2S / 1P / 1G Port



386DX-33MHz	$815
386DX-40MHz	$819
486DLC-33MHz	$955
486DLC-40MHz	$995
486SLC2-50MHz	$1029
486DX-33MHz	$1105
486DX-50MHz	$1245
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SYSTEMS'S CONFIGURATION

- 256K Cache
- Zero MB RAM (Upgrade to 32)
- 1.2MB FDD & 1.44MB FDD
- 170MB Hard Drive
- SVGA Graphic Card w/1MB
- SVGA Monitor (.28dp) 1024x768
- 101 Enhanced Keyboard
- 2 Serials Port
- 1 Parallel & 1 Game Port
- Mini-Tower Case

PLEASE CALL FOR THE PRICE OF MEMORY

*386DX'S System w/128K Cache - 486SX & 486DLC w/64K Cache

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OPTI	486DX-33w/256K	1/2Size	125
OPTI	486DX2-66w/256K	1/2Size	125
OPTI	486DX-50w/256K	1/2Size	125
ALI	486DX-33w/256K	1/2Size	110
ALI	486DX2-66w/256K	1/2Size	110
ALI	486DX-50w/256K	1/2Size	110
OPTI	386DX-40W/128K		145
OPTI	386DX-33w/128Kw/oCPU		90
ALI	386SX-33w/CPU		90
OPTI	386SX-25w/CPU		86

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SIS	486DX-50w/256K		135
SIS	486DX2-66w/256K		135
OPTI	486DX-33w/256K	BabySize	150
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UMC	486dxW/256k3VLSlots		135

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- -Mini-Tower Case

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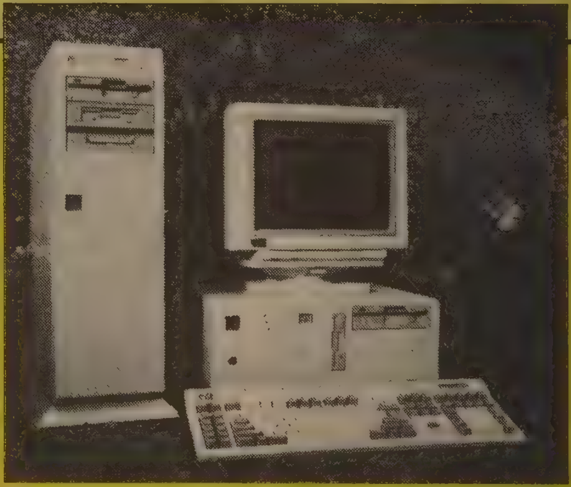
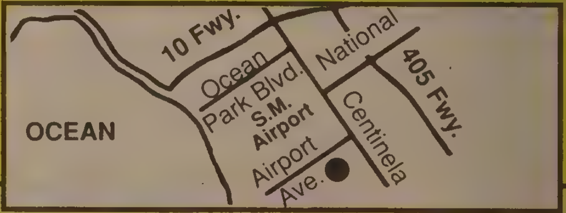
intel inside





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- 2S/1P/1G
- Hi-Res. Mouse
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- 8K Cache Int.
- 1.2 & 1.44MB FD
- 256MB HD 13ms W/64K Cache
- 32 Bit VESA Local Bus FD/HD Controller
- 2S/1P/1G•Hi-Res. Mouse
- 101 Keyboard(Japan)
- Non-Interlaced .28 Super VGA Color Monitor
- 32 Bit VESA Local Bus Super VGA Card W/1MB (Windows Accelerator, 1280x1024, 16.7M Color)
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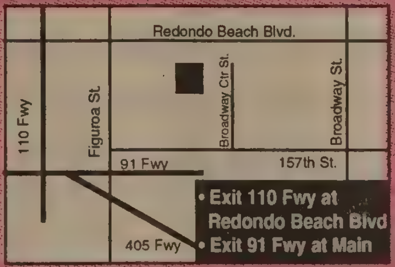

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- * IDE Floppy/Hard Drive Controller card
- * 2 Serial, 1 Parallel, 1 Game Port
- * VESA Local Bus SVGA Graphics accelerator card w/1MB. Resolution up to 1280x1024. 72Hz refresh rate. 16.7 mil. colors.
- * 14" NON-INTERLACED Super VGA color Monitor. 72Hz at 800x600. .28 dot pitch. Maximum resolution 1280x1024.
- * 101-Key Keyboard
- * Hi-Resolution Mouse

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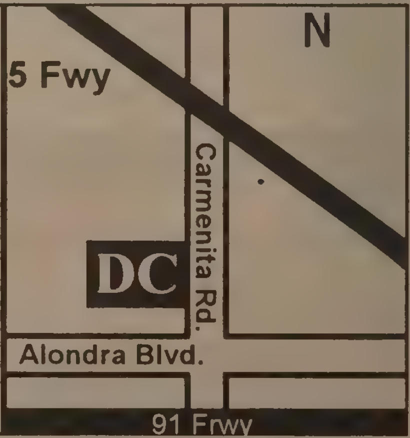

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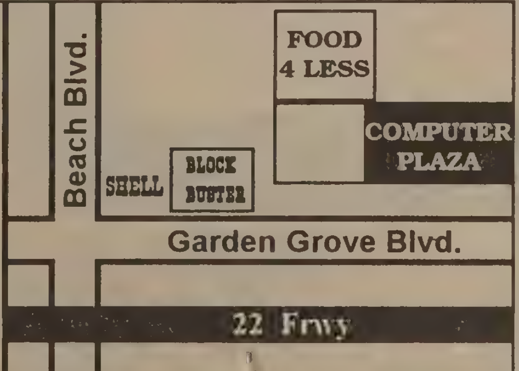

continued from page 64

each other, but we want the Microprose customer as well as the Spectrum HoloByte customer to still get their kind of products. And that requires that the groups be independent.

What's the point? It's cheaper just to hire the people. Why buy a company if all you're going to do is assimilate 'em all under one roof? It doesn't work that way in this business.

Microprose is public and you're private. How are you dealing with this interesting circumstance?

[*laughs*] It's a very interesting circumstance. It would be easier if they were private. It would be easier if we were public. In fact anything would be easier than the way we're doing this.

Basically, when the two companies are merged together, it will be one publicly held company, and we'll have our stock be fully registered, and our stock will be swapped with their stock and then we'll be moving forward.

But it means you have to have an army of lawyers. Somebody said, "This is a great way to save on brokerage fees. You don't have to go public now, Gilman... You backdoored your way in." I will tell you, it is as expensive doing it this way as it is going public. But we thought the company was very, very good, and had just tremendous people there, and there was a natural fit between the two organizations.

How is it that back in the garage days you were doing games instead of word processors?

I used to make paper games when I was a kid. My parents never bought us toys. They bought us scissors and cardboard and wood and nails—we made our own toys. So I was always fascinated by computers and thought hey, maybe I can take some of my board games—my favorite one was my Star Trek game—and make it into computer games. So I snuck down to City College in San Francisco and used time on their computers.

I always wrote games. I was going to major in computers, and my high school counselor said, "Don't major in computers. What are you going to major in computers for? Go major in business, and then you can do games for the rest of your life. Take as many computer classes as you like, but major in business and then figure out how to do what you love to do for the rest of your life." That was the greatest piece of advice I ever got.

San Francisco public schools have the honors program, with advanced placement classes. Typically you got tracked into one of those classes and you were tracked into them for the rest of your life. So I was always tracked into that, ever since grammar school. My problem was, of the thirty kids, I was always the thirtieth, and there were always twenty-nine kids a lot smarter than I was. Twenty-nine overachievers, and I was the guy dragging the curve down.

So it was really funny—my counselor said, "There will always be twenty-nine kids smarter than you. Therefore, why don't you go into business, and then you can hire them!" [*laughs*] "But if you try to be like them, you'll never be as good as they are." Good advice.

See, public schools do work!

You ran for San Francisco school board a while back. Why did you do that?

I was always interested in school and kids. It was sort of my payback to society. I really felt that nobody really paid much attention to schools, other than building contracts and personnel contracts. Nobody really cared about what it was like to be a kid in those schools, and I had to grow up there.

I remember when I was 16—I was a horrible 16-year-old. I spent more time protesting and causing problems in the school district than I did in my classes.

Well, it was the times.

It was the times...

I led a group for school reform, but 16-year-olds. And the superintendent said he wasn't going to let a bunch of 16-year-olds tell him how to run the school district.

So we just said, we'll be back. [*laughs*]

I serve on a lot of committees in the school district, and the San Francisco School Volunteers, which is a nonprofit agency that helps all the volunteer programs in the San Francisco public schools. It's very satisfying work, and one of these days I'll figure out how to make money in educational software and make that part of our business as well. I just haven't figured it out yet.

Mainly because I don't believe computers do a good job yet. They're not very effective in the classroom.

And if you can't afford a textbook, you can't be allocating computers. You can only spend $32 per student for textbooks in San Francisco public schools. It's a hard argument to make, to get a personal computer. (Spectrum HoloByte, 510/522-3584) ■

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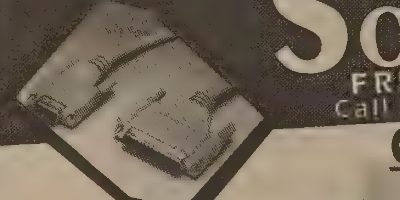

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PREVIEW: CONFRANCISCO

51ST WORLD SCIENCE FICTION CONVENTION
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OVER SEVEN THOUSAND PEOPLE from around the globe are expected to attend ConFrancisco, which begins on September 2 and features panel discussions, an art show, a masquerade competition, and many other activities showcasing the creativity of the science fiction community.

Prominent among the events is the annual presentation of the Hugo Awards, honoring excellence in the science fiction and fantasy genres. Previous Hugo winners Larry Niven and Alicia Austin will be among ConFrancisco's honored guests, and many well-known publishers, writers, and artists will attend.

In addition, hundreds of panels, lectures, and workshops offer topics of interest to a broad range of enthusiasts, much of it touching on the convergence of the computer world and science fiction. Among the titles:

INVENTIONS THAT REALLY DID (OR WILL) CHANGE HISTORY
COMPUTERS AND CLASS
HOW HARD CAN IT BE TO START A GAME COMPANY?
VIRTUAL WORLD BUILDING
REAL COMPUTER ART
GHOST TALES AROUND THE HIGH-TECH CAMPFIRE
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INTRODUCTION TO COMPUTER NETWORKING
NEW SF COMMUNITY: FANS & PROS ONLINE

Other themes range from "Science in Star Trek" to "Across the Rim: Japanese Science Fiction Fandom" to "Testosterone Poisoning" to "Brewing in Space." Additionally, there will be computer graphics presentations by Disney and Industrial Light and Magic.

The convention runs from Thursday, September 2 through Monday, September 6. For registration and other information, contact ConFrancisco, 712 Bancroft Road, Suite 1993, Walnut Creek, CA 94598, (510)945-1993, fax (510)945-8705.

SPECIAL EVENTS

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MUSIC/FILK CONCERTS: FRIDAY, SATURDAY, SUNDAY NIGHTS, ANA HOTEL
'60S ROCK DANCE: FRIDAY, 9 PM, ANA METRO BALLROOM
SCIENCE FICTION AND FANTASY MASQUERADE: SATURDAY, 8 PM, ESPLANADE BALLROOM
REGENCY AFTERNOON TEA DANCE: SUNDAY, 2–5 PM, ANA METRO BALLROOM
HUGO AND OTHER AWARD CEREMONIES: SUNDAY, 8 PM, ESPLANADE BALLROOM
TIME TRAVELLER'S FASHION PARADE: MONDAY, 11 AM–NOON, ESPLANADE BALLROOM
CLOSING CEREMONIES: MONDAY, 3 PM, ESPLANADE BALLROOM

PROGRAM
(SUBJECT TO CHANGE)

MAIN PROGRAMMING: PANELS, LECTURES, PRESENTATIONS, WORKSHOPS

THURSDAY 2–7 PM
FRIDAY 10 AM–7 PM
SATURDAY 10 AM–7 PM
SUNDAY 10 AM–7 PM
MONDAY 11 AM–3 PM

READINGS AND AUTOGRAPH SESSIONS

FRIDAY 10 AM–5 PM
SATURDAY 10 AM–5 PM
SUNDAY 10 AM–5 PM
MONDAY 11 AM–NOON

KINESTHETIC TRACK OF PHYSICAL ACTIVITIES (AEROBICS, MARTIAL ARTS, TAI CHI, DANCING)

FRIDAY 9 AM–5 PM
SATURDAY 9 AM–5 PM
SUNDAY 9 AM–5 PM
MONDAY 9 AM–NOON

YOUNG FANS' (CHILDREN'S) PROGRAMMING

THURSDAY NOON–5 PM
FRIDAY NOON–5 PM
SATURDAY NOON–5 PM
SUNDAY NOON–5 PM

MEETINGS:

WORLD SCIENCE FICTION SOCIETY

FRIDAY NOON
SATURDAY NOON
SUNDAY NOON

SFWA (PROFESSIONAL SF WRITERS)

SATURDAY 10 AM

ASFA (SCIENCE FICTION ARTISTS)

SUNDAY 10 AM

Special Science Fiction Story:

We'll Return, After This Message

BY JOHN WALKER

When the foundations of everything you think you know shift beneath you, you can *feel* it. The night Art Crane and I found the Message, it felt like that moment at the onset of an earthquake when you realize the floor is really moving.

What we found that January night twenty years ago expunged a century's accumulated smugness about our place in the universe. And the funny thing is, we weren't even looking in the right place.

In December of 1997 it seemed as if humanity was well on its way to figuring out the universe. The discovery of the Proteus particle by de Vany, Trang, and Zweig handed the astronomers an all-in-one answer to the riddles of the missing mass and the solar neutrino deficit. The human genome project was winding down, having yielded, if little understanding, plenty of data. The ESA/Russian outer planet robots were flying in formation toward their Jupiter gravity kick, thence to Voyager's ports of call and onward to Pluto and Charon. The Shuttle was expected to return to flight any month. That glorious daylight supernova of 1996 was just beginning to fade from the nighttime sky.

***

When I answered the phone on that rainy day after Christmas, I wasn't surprised to hear Crane's usual request, "Cliff—I'm down here at the office. Could you come in and help me with something?"

Art Crane's a programmer, and a damned good one. But mostly he is the Bach of the wild-ass conjecture. You can't spend ten minutes with him without hearing him suggest a new mechanism for speciation in biology, opine that the roots of monetary inflation lie in the domestication of animals, or wonder how we'd know if just a *few* electrons had different masses. He writes every idea down in a little notebook he always carries, then he types them all into his machine every night. I haven't asked him how big the file is.

Crane's office resembled a centerfold from *Toxic Waste Monthly*. I suppose an archaeologist could date the slices of pizza by the quantity of mold.

He reads everything, seems to know all, has opinions on any topic you can name, but will gladly argue either side. He brooks no inaccurate facts or sloppy reasoning. He's the kind of person who'd be intimidating and unapproachable, if only he ever *finished* anything.

He isn't a flake. At least not all the time. When he gets a Big Idea, he's like a terrier. He grabs it and shakes it till it falls apart. Then he sniffs at the pieces.

For some reason, whenever he has a Big Idea, I always seem to get involved. Not that I mind. Except for the stock market idea. That one I minded.

Christmas day, Crane and I had been invited to Hack Watkins' for turkey dinner. Later, as we watched Watkins' kids reduce their holiday bounty to pieces siftable through chicken wire, Art was holding forth on his latest idea—second-hand SETI.

He was fascinated by pre-discovery observations. Galileo spotted Neptune and even charted it next to Jupiter in one of his notebooks. If the next night hadn't been cloudy, he'd probably have discovered it more than 200 years before Adams and LeVerrier. And only the year before, more than a hundred amateur astronomers took pictures showing the Orion supernova brightening before it burst into naked-eye visibility, but not one noticed it till after the fact.

Crane said this was inherent in modern science: building big new machines and using them for bold searches was sexy and easy to fund, but rarely did anybody rummage through the dusty archives until something interesting had turned up in new data. He figured that if we ever received a signal from another civilization, we'd probably find dozens of others buried in the archives, easily located once we knew what to look for.

When I headed home around midnight, he and Hack were kicking ideas back and forth about how image processing tools might be used to identify intelligent signals.

***

I showed up at the office around sunset. Not a soul was there, and only a few programmers.

Crane, who never rose before the crack of noon, rarely undertook serious work before six. I was surprised to discover him already in his office, surrounded by a midden of

continued on page 85

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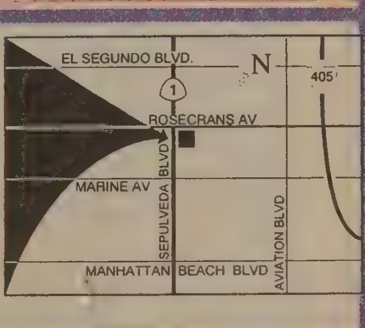

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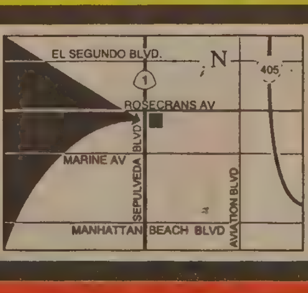

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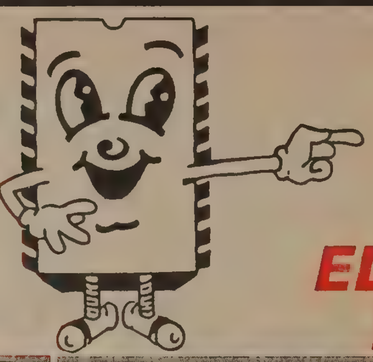

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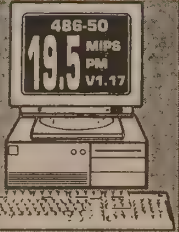

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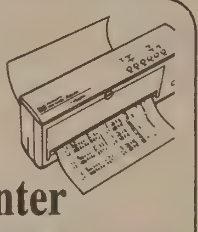

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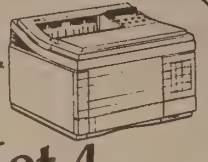

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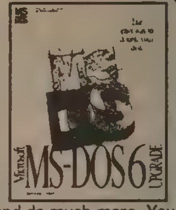

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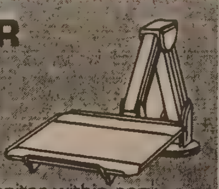

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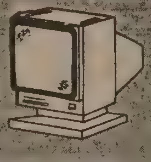

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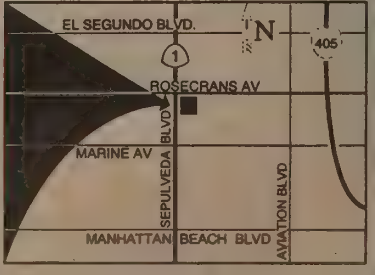

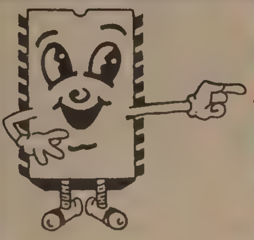

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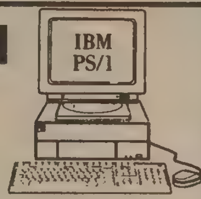

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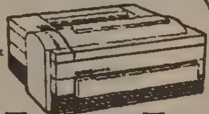

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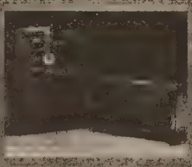

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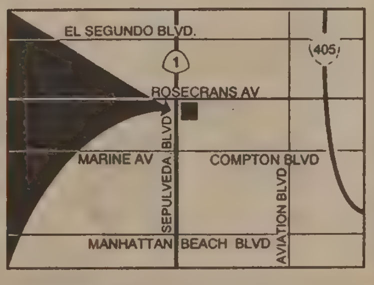

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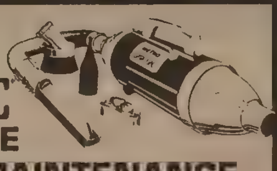

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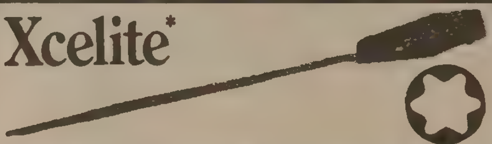

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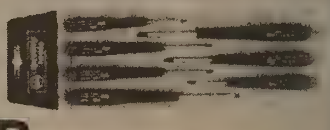

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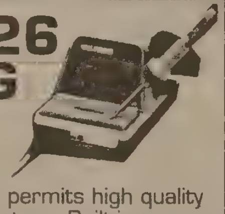

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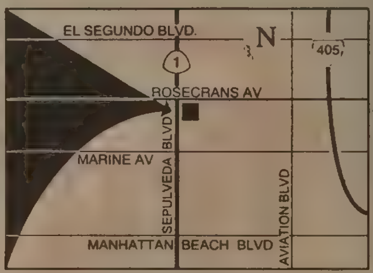

continued from page 78

books, pieces of paper, and partially consumed processed food-like substances suggesting, by its height, that he'd been there for several hours. He turned from the screen as I walked in, "Cliff, glad to see ya. Look, we gotta get more crunch power on this job."

This was the week for it.

The company always closed between Christmas and New Year's. It was a tradition they called the "Annual Week Of Rest," which was a fine joke because there was another tradition that the programmers would use a week devoid of managers, marketeers, meetings, and memoranda to try to outdo one another in huge bursts of concentrated effort to impress each other, and just incidentally enrich their employer, when they staggered back, bleary-eyed, to another year of "regular work." Not that it was expected, of course—but all the computers were left running that week anyway. The Exalted Founder had started it fifteen years ago and still kept at it, at least in theory. Nobody could tell, actually; he'd gone through some kind of comprehensional singularity and nobody understood anything he'd done in the last five years.

Back in '97 Xanadu still wasn't finished, but if you knew where to look and how to access it on the Net, you could get most of the machine-readable raw science data since 1970. The Net was installing a new software release over the holidays and had declared connect time and data transfers free between Christmas and January 5 to encourage users to test it.

Art proposed to make the most of this. He planned to search all kinds of astronomical data, from the earliest radiotelescope sweeps to the downlink from the gamma ray imaging telescope in that converted shuttle tank with an algorithm he called the "annoyance filter."

He figured the message would be a picture, and that it would be deliberately made easy to distinguish from a noisy background. This was right down Crane's alley. A couple of years before he'd been obsessed with the idea of developing a program to discriminate television programs from commercials. He wanted to start a company to make boxes that paused VCRs when commercials came on. He considered it an artificial intelligence challenge: "If any idiot can fast forward past a commercial, why can't we design a program to zap 'em?" He spent the better part of a year's spare time tweaking and tuning his algorithm before abandoning it; toward the end it worked pretty well, but wasn't good enough to sell—it recorded moody commercials and edited out climactic scenes of cop shows. It *did* zap all the car dealer ads.

He likened the problem to protective coloration. "If television is a medium that delivers entertainment at the price of advertising, then advertising and entertainment will coevolve to become indistinguishable in time."

But in SETI, he believed, the incentives were different. "Signal to noise! Look, are you going to go before the Congress of Galactic Elders Subcommittee on Unessential Projects and try to justify spewing terawatts of soft-sell to the stars? Whatever they're sending, it's going to be obtrusive, blatant, shrill, noisy, coarse, and puffing. It will be calibrated to attract, to rouse, and to entice. Count on it...it's *advertising*."

There's a feeling of power that comes from knowing you're doing more calculations every minute than all of mankind did from Pithecanthropus Erectus to 1950, but the novelty of even so remarkable a fact quickly pales into something akin to watching paint dry.

He started by taking the commercial zapper and optimizing it for single still frames by training it on magazine advertisements. Then he wrote a front end that scanned bit streams and applied a Fourier transform to recognize scan-line encoded images. These he planned to link into a tool that could process several hundred megabytes of raw data per hour per machine, generating very few false positives for intelligent messages. When I showed up, he said it was "coming along."

There are several distinct phases in an Art Crane project. The first is "inspiration"; he'll be consumed, usually without warning, by a Big Idea. He'll corner everybody in sight, talking a hundred words a minute, filling white boards with diagrams, shoving a sheaf of yellow paper in people's faces, and otherwise explaining why what he just thought of is not only the most important project on the planet at that particular moment, but painfully obvious to any vertebrate. Art has a talent for seeing how tools can fit together to do things they weren't designed for. His ability to estimate the difficulty of all the tasks involved in his plans is more modest.

"Coming along" means he's making steady progress, but doesn't have much to show for it. Eventually, he'll get an initial, crude version to work, achieving a characteristically grandiose milestone he calls "initial operating capability." Thereupon he invariably "goes ballistic" as he begins to realize all the things he can add to the initial version. "Ballistic" is evocative not only of Crane's disregard of external guidance, but also of the frenzy and round-the-clock concentration that characterizes his efforts, rendering him in this mode more a force of nature than a colleague. This ends at a point of exhaustion when he's run out of things to add to the product or can't sustain the kind of effort he's been putting in, whereupon he enters the "gory details" period as he attempts to clean up all the loose ends and render the result usable to people other than himself. Finally, he deliberately "throttles back," catches up on his reading, and comes within a standard deviation or so of a normal human being as he awaits the next Big Idea.

The progression of phases is as predictable as the Moon's, but their timing has none of the regularity of the cosmos, much to the exasperation of all who work with him.

Still, when he is good, he is very good indeed. Three times in the last decade he had singlehandedly come up with the concept and initial prototype of products that now collectively accounted for half the company's sales—each one stemming from a Big Idea unrelated to his regular work. This track record made management more than willing to endure his eccentricities and propensity to indulge in what Watkins called "art for Art's sake."

He picked up the pizza box to the left of his keyboard and carefully stacked it atop a pile of books to clear a workspace. Grabbing a yellow pad and pen, he explained what he needed from me. "We can do this, but we've only got nine days till the Net starts charging again. Remember that cycle sucker animal you built for the inlet problem? That's what we need to drive the filter."

For once what he wanted wasn't that hard. Last year when we'd worked on a hypersonic fluid flow problem for the Japanese spaceplane, I'd partitioned the job to throw all the idle time on all of our workstations at it. This was easier. All I had to do was take the data stream from the Net and apportion it out to all the compute resources I could lay my mitts on with an eenie-meenie-miney-moe distributor. With five hundred workstations rated at a gigaflop or better sitting idle until the new year, we'd be able to cull a lot of data in a few days.

I went down the hall to my office, turned on the monitor, and set to work. The linear flow of real time changed into programming hours, measured more by the accumulation of pop cans, pizza and Chinese take-out boxes, and crumpled sheets of yellow paper than by numbers on the wall clock.

Art continued to tune the annoyance filter while I developed tools to obtain raw data from the Net, translate them into a uniform format his program could read, and partition the compute job among the machines in the building. Hours passed, then days. I went home and slept when I was too tired to go on, and I presume he did too.

We'd both finished by Monday the 29th. When I arrived, Art had queued me mail saying, "Ready when you are." I walked down the hall thinking how odd it was that I'd been collaborating on a project with him, working in the same building, but hadn't seen him for four days. When I reached his office, I realized this was a good thing; the remains bespoke a major ballistic episode. Crane's office resembled a centerfold from *Toxic Waste Monthly.* I suppose an archaeologist could date the slices of pizza by the quantity of mold.

I focused on the task at hand. It took a couple of hours to integrate Crane's filter with my dispatcher. When we were done, we ran some tests to measure the total compute power we were getting, then some known data checks to make sure we hadn't messed anything up. Around midnight we were ready to start on live data. For the last several days I'd been keeping our Net link busy transferring files we wanted to search to our local server since we could process on-site data much faster than remote files across the Net. Also, I wanted to copy as much data as I could while Net access was free. I didn't have the time to be very discriminating in my acquisitions; if a Net site had some files of interest and didn't publish a huge amount of data, I just figured, "Grab it all. Let Crane sort it out."

I entered the command to start the root task. It cloned itself onto every active workstation in the building, then each copy started pulling files to be searched from the master task queue and commenced scan-

continued on page 91

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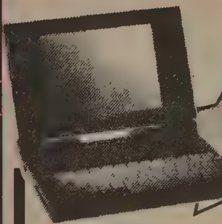

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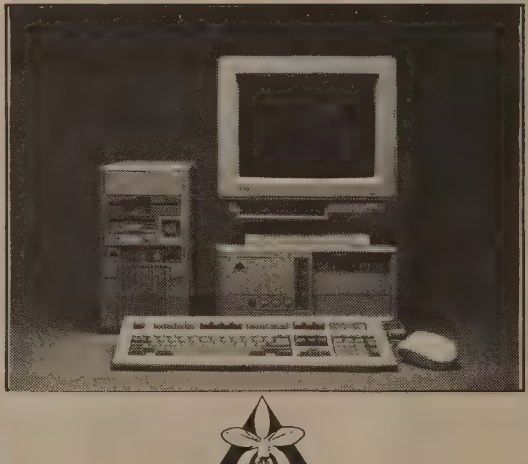

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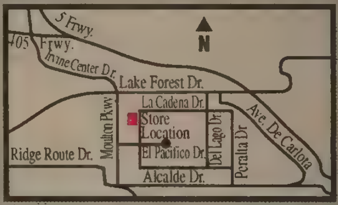

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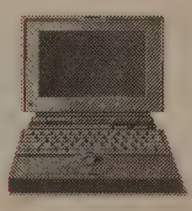

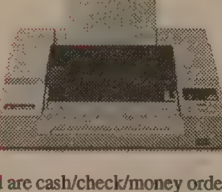

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ning them with Crane's annoyance filter.

The search was singularly unexciting. My task monitor showed the volume of data we'd scanned so far, the percent done, and the instantaneous compute power we were using. There's a feeling of power that comes from knowing you're doing more calculations every minute than all of mankind did from Pithecanthropus Erectus to 1950, but the novelty of even so remarkable a fact quickly pales into something akin to watching paint dry.

Every time Crane's annoyance filter triggered, my control program popped up a window with the image on both our workstations and filed the picture for later examination in a directory called WOW. The filter seemed to be working quite well. We got an image about every hour—mostly scanned illustrations from journal articles erroneously filed in raw data directories. Art figured we could ditch them by looking for captions, but they were appearing so infrequently he decided not to delay the search to modify the program.

Around 3 am Tuesday we were both taken aback when we found our first genuine interstellar message: a spacecraft, two beings, and some coded gibberish. Art looked at the source information in the title bar and confirmed that we'd discovered the Pioneer plaque in a NASA Goddard planetary image archive. "Right message, wrong way," he muttered.

We decided to call it a night. With the search on autopilot, we could dial in from our home machines and scan the images in the WOW directory whenever we wanted. I, for one, had no desire to spend any more time in Crane's office until the janitors came in next week and cleaned it with a fire hose.

Tuesday, I slept late, gave the plants their biennial sip of water, unloaded the dishwasher, and didn't get around to dialing in to see if anything had been found until close to midnight. I looked over the 20-odd pictures in WOW and found the usual selection of false alarms. I checked the login history and saw that Art was dialing in every couple of hours to scan the pictures. The company was closed until Monday the 5th, so we'd have the better part of a week to continue the search. I figured we could get through about a quarter of the obvious candidate data on the Net in that time.

The audacity of two programmers employed by a medium-sized software company searching three decades' accumulated scientific knowledge for interstellar messages didn't occur to me. I doubt Crane was capable of entertaining such a thought.

* * *

With the search for intelligent life in the universe toiling away, needing only sporadic attention, I turned my attention to serious work. The company had bought one of the just-developed superconductive long range NMR scanners, and I was working on a prototype for a product I called "Fantastic Voyager" that let you fly around in a 3-D image of your own body using the cyberspace gear we made. The job was challenging both from the standpoint of identifying the different tissue types from the NMR samples, and in developing navigation models to let you trace the paths of blood vessels and nerves through the body.

Since my home machine had all the power and storage I needed, I worked there, as usual disappearing into the project and surfacing only sporadically to eat, sleep, or dial in to scan the WOW directory.

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Wednesday night I stopped by Bart Lazslo's New Year's Eve party for a couple of hours and was amused to hear Crane grandiloquently describing our little holiday hack as the "Crane/Slatkin Quest For Galactic Intelligence." He related our discovery of the Pioneer plaque much more dramatically than I could have, or, for that matter, than the facts justified.

He'd brought a portable computer and hooked it up to show pictures from the WOW directory on Bart's projection TV. He'd even programmed a scrolling subtitle, "LIVE from the accumulated wisdom of mankind." Much to the amusement of those irritated by Crane's antics, that night the fount of wisdom yielded up a scatter plot of globular cluster velocities, what appeared to be a calibration signal for an interferometry run, and, at the stroke of midnight, an order form for the "Proceedings of the 1993 IAU Vienna Workshop on Relativistic Jets." Sue Hardiman went to the piano and composed a song on the spot. All I remember is:

Crane pursued the aliens
Through the archives on the Net.
But the aliens came and kidnapped
Crane
In their Relativistic Jets.

When I left, they were still adding verses of monotonically decreasing quality. Crane was singing along lustily.

***

I spent the rest of the week in a happy blur, working on Fantastic Voyager. Every now and then Crane or I would notice something amusing in the WOW directory and send mail pointing it out, but otherwise I didn't pay much attention to the search.

By Sunday night, Fantastic Voyager was working pretty well. After tiring of flying lazy orbits around my pancreas, I finished up the documentation describing Fantastic Voyager. Another part of the Week of Rest tradition was that the day the company reopened, papers describing the programmers' projects would appear in everybody's mailbox and the software would be on display in the Demo Lab. After I queued the paper to the mail system, I drove down to the office around midnight to install Fantastic Voyager on the lab machine and make sure it worked there.

Also, I wanted to double check that the Quest was set to shut down before 5 am when the Net started charging again. At normal prime time rates, our data transfers for the Quest would've gone through my monthly salary every day, and I wasn't about to get docked a couple of weeks' pay due to a typo.

Crane was in his office, writing up his Week of Rest project, a redesign of an obscure internal algorithm that would speed up one of our products about 30%. He'd actually cleaned the place up, to the extent of even returning most of the books to the bookshelves that covered the walls. We chatted for a couple minutes, then I went down to the Demo Lab and he returned to his documentation. As usual, my demo didn't work the first time—I had to dial into my home machine and copy some files and rebuild. Anyway, it was almost 3 before I was satisfied it would work that afternoon.

The audacity of two programmers employed by a medium-sized software company searching three decades' accumulated scientific knowledge for interstellar messages didn't occur to me. I doubt Crane was capable of entertaining such a thought.

I went back to my office and locked up, then stopped by Crane's on the way out. He'd finished and queued his document, and was idly flipping through the 150 or so pictures in WOW. He said we'd accomplished something worthwhile and suggested we should write a paper about the Quest. Every message we'd found, after all, was the product of intelligence. If we'd broadcast the Net feed to the stars, any civilization with our program would have found ample evidence of intelligence. He thought we might be able to persuade the investigators on the various radiotelescope projects to routinely run our filter over their data, forwarding all the images it found to us for examination.

We talked about how we should phrase such a paper and what journal might publish it, and so on, in the kind of lazy-days bull session exhausted programmers are prone to as they sit on a virtual veranda on the banks of the Mighty Megaflop and watch time and data flow by.

"Peep." Another image popped up on the screen: a NASA logo. Crane hit the key to file it away. It was already 4, so we decided to sit around and make sure the Quest terminated on schedule at 4:50. Nobody'd be expecting any programmers to show up much before 2 pm, so there wasn't any reason not to see it through.

Our conversation was describing a chaotic orbit around the usual attractors of evolution, anarchy, programming languages, quantum electronics, and office politics, when we got another "Peep." It was 4:32:19.217 PST.

I can vouch for the time; it's in the execution log. My memory of what happened after the image popped up on Crane's screen is less precise. We glanced at the screen, then we stared at it. The image filled about a quarter of the screen; it was 2039 by 2053 pixels. Four bold black diagonal stripes set off each corner and continued as thin alternating black and white pinstripes along the edges of the image. Had the upper left stripe proclaimed "New!," the layout would've blended indistinguishably into *Time* or *Scientific Enquirer.* What was within the border was another matter entirely.

The figures on the right were humanoid, but not human. They were simply the best aliens I'd ever seen: there wasn't a single missing or disproportionate characteristic about them, but they were *all wrong* to be humans. There were two adults, male and female—the female was holding a little one. On the left was what was clearly a conversion table between binary numbers represented by "-" and "|" and eight digit symbols. The middle of the picture was divided into four boxes, three with a large central dot, curved lines, and nomenclature using the eight digits. The fourth contained what could only be an orrery presentation of a planetary system. At the bottom were four rows of sixty-four of the digits given at the left of the picture.

Art rolled his chair over to the screen to

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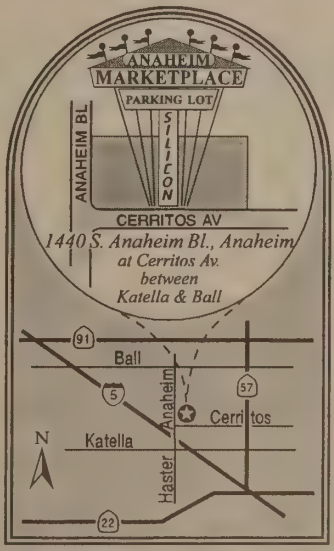

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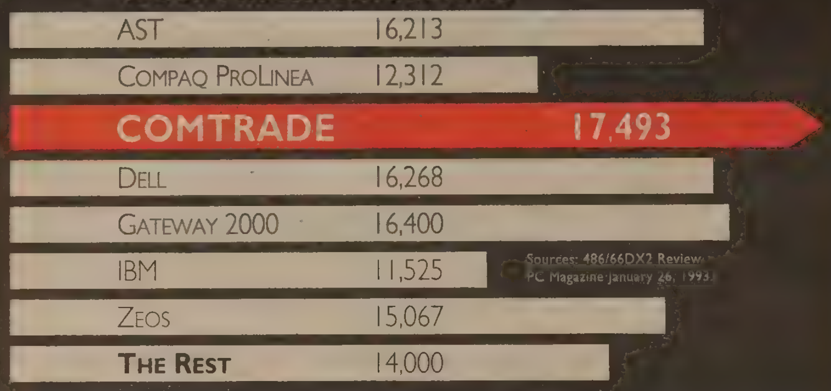
Comtrade Zaps The Competition!



Sources: 486/66DX2 Review PC Magazine January 26, 1993.

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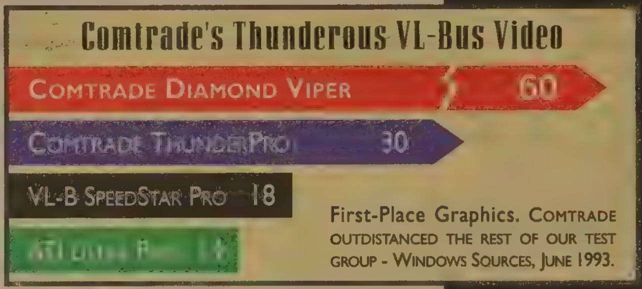
> The Comtrade 486 achieved the best processor performance of all profiled systems.
> - PC Sources, February 1993.



First-Place Graphics. Comtrade outdistanced the rest of our test group - Windows Sources, June 1993.

WinMark 3.11 (Million pixels per second); Diamond Viper with new driver.

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Once again **"The Comtrade PC"** has the competition running for cover. In review after review, critic's applaud Comtrade shocking speed and extraordinary value. According to the recent PC Magazine, Comtrade's 486 system "Has The Performance Issue Licked." It's no wonder Comtrade is awarded PC Sources Magazine **"Direct Hit"** (Best Buy/Editor's Choice) (Feb 1993). "It's A Very Swift Graphics Machine," says Computer Shopper (May 1992). "That Deserves Serious Consideration from Anyone Who Wants to Juice up Windows." Comtrade's latest VESA Local Bus ThunderPro or Viper graphics accelerators are even up to 3 to 10 times faster [illegible] reviewed systems.

No Contest!
Comtrade processor outpaced all the other - Windows Sources, June 1993.

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continued from page 92

check the source. I looked over his shoulder. We looked at each other.

What we were looking at was either the most brilliantly executed gotcha I had ever encountered, or, well...precisely what it appeared to be. Crane wasn't a practical joker and neither was I, but after Lazslo's party all the usual suspects knew what we were up to, and half a dozen of them would enjoy nothing more than sending us on a merry chase. Art copied the source identifier, "HGIDB11-23@NIH.GOV" into his notebook, tore out the page, and said, "I think you'd better verify this across the Net, and don't use any software we've developed this week; it may have been tricked."

Just to be extra careful, I dialed into one of the commercial compute services the company subscribed to and used standard retrieval and image processing tools in that system's library to extract the image from the location Crane's filter had spotted it, accessing the read-only master published copy of the database across the Net. It took me two hours to be sure.

When I returned to Crane's office, the eastern sky was brightening with dawn. It was going to be one of those windy January days when the air is so clear even the distant mountains seem close enough to touch. Yet on this morning, only the weather seemed clear.

Crane had also been checking out the Message.

If I'd been more selective in choosing data to scan, we'd never have found it. There could be no doubt; the Message was real, and it was right smack in the middle of where it most definitely didn't belong. We had found it in the NIH Human Genome database.

* * *

Every human who'd turned his eyes skyward wondering, "Are we alone?" had been carrying the answer, all along, in every cell of his body. Since then the same Message has been found in every mammalian genome that's been dumped, yet nowhere else in the animal kingdom.

That checks with the age of the Message. Three of the boxes in the middle of the Message are orthogonal views of the Local Group galaxies, centered on the nucleus of the Milky Way. Running their motion forward from the positions in the chart to the present day dates the Message at about 250 million years before the present: just about the age of mammals. The orrery indicates they came from the fifth planet of a star with six terrestrial planets and three gas giants. Which star? Nobody has a clue, and what with differential motion over an entire circuit of the Galaxy, any position in the Message would be worthless anyway.

Whoever wove that Message into our DNA meant it to last until we figured out how to read it—it's built inextricably into the protein expression mechanism so any organism with a corrupted copy won't be viable.

It's obvious in retrospect. If a visitor wants to leave a message, why not make it a self-reproducing, error-correcting message that any sentient race would stumble upon as soon as they undertook to reverse engineer their own design?

Crane immediately suggested what's become the consensus hypothesis about the number at the bottom of the Message. He thinks it's the product of very large prime numbers and that when we manage to factor it, they'll be the key to decode the second Message. Two problems: first, we either need to learn a whole lot more about factoring, build computers a million times faster than the latest quantum electronic models, or else wait the tens of millions of years it looks like factoring that number will take.

Second, we have yet to find the other Message. Nothing more has been found in the genome, although Crane and many others suspect the factors of the key number may direct us to additional information there. The intensive radio SETI program sparked by the Message has proved barren. So have the planetary explorations of the past fifteen years, spawned by the possibility that those who placed the Message may have left a calling card somewhere in the Solar System. More recently, the limitations of robots in seeking the unexpected has triggered the rapid expansion of the human presence into space. If we've found nothing, we've learned much, and perhaps we've taken our first steps in the footprints of those who left the Message in our genes.

Crane believes that when we find the second Message and are able to read it, we'll have proved ourselves ready for the instructions it contains. He thinks it will tell us how to find those who left it, and how to go there.

We'll return, after this Message, and I think they'll be proud of us. They were already proud when they put the Message there a Galactic year ago. Proud enough to have signed their work. ■

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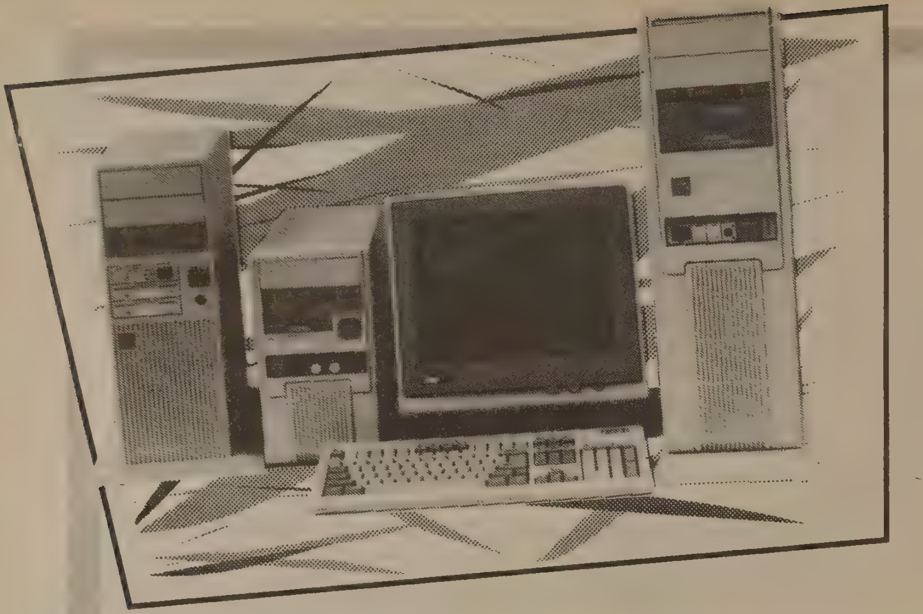

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Marketing Edge & Technology Source

continued from page 52

3:15–4:30 pm

PCMCIA and Its Role with Energy-Efficient Computer Products:

John Reimer, Chair, *Chairman, PCMCIA*

A panel discussion of PCMCIA as a new, emerging technology and how it supports the growth of the "green" PC.

Panelists include:

Hans DeBruyn, Chair, PCMCIA Committee, IBM Canada
Leon Malmed, Vice President of Worldwide Sales & Marketing, SunDisk
Cynde Magidson, Xircom
Dan Sternglass, DataBook

Friday, September 10

9:30–10:30 am

KEYNOTE - John Osborne, OS/2 OEM Worldwide Director

10:45 am–12 noon

Multimedia in Corporate America

Dr. Clive Liu, Chair, *President, PixoArts*

An in-depth look into the current growth of and market for multimedia products in the corporate computing environment.

Panelists include:

Keith Walker, Product Manager, Eastman Kodak
Ash Jain, Executive Vice President, Workstation Technologies, Inc.
Damon A. Dean, Market Development Manager, Multimedia World Magazine
James Crowe, Western Reg. Dist. Manager, Alantec, Inc.

12:15–1:30 pm

The Changing Face of Internetworking: Choosing your PC Platform

Panelists include:

Representative TBA, Pacific Bell
Gary Law, Synoptics
Representative TBA, Compaq
Mike Hulme, Zilog
Mary Goudreault, Manager of Indirect Distribution Programs, WilTEL

1:45–3 pm

Emerging Brand Supplier-Reseller Roundtable

Alan Weinberger, Chair, *CEO, The ASCII Group*

An open discussion on what resellers look for when they decide to do business with a new supplier in an emerging brand or emerging technology category.

3:15–4:30 pm

Technology Trends in the PC Industry

Mary Eisenhart, Chair, *Editor,* MicroTimes

Learn about CPU platforms and advanced operating systems, and the marketing, pricing, and sourcing issues involved in choosing a vendor.

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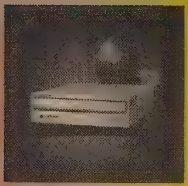
4FGE 15" 1024x768 non-interlaced, 75Mhz, .28dp	742
5FGE 17" 1024x768 non-interlaced, 76Mhz, .28dp	1120

SONY

1304S 14" 1024x768 non-interlaced, 57Mhz, .25dp	$576
1604S 17" 1024x768 non-interlaced, 57Mhz, .25.dp	895
1730 17" 1024x768 non-interlaced, 72Hz, .25dp	995
2036S 21" 1280x1024 non-interlaced, 70Hz, .25dp	1945
2038 20" 1600x1200 multiscan, 60Hz, .30dp	2145



Archive Hi-Lite

250MB Tape Back-up

$179

Multimedia

Media Source Bundle
Sony 31A CD ROM
16-Bit Pro Audio Spectrum-16 Sound Card
2-Way Speakers
6 CDTitles:
- Works for Windows
- Mavis Beacon Teaches
- World Atlas
- US Atlas w/Automap
- Reference Library
- Secret Weapons of the Luftwaffe

$445

Colorado 120MB Tape Back-up **$159**

Colorado 250MB Tape Back-up **$195**

HEWLETT PACKARD 4L, 300dpi

$675

HP Deskjet 1200C

Color Inkjet, 7ppm, 600 x 300 dpi

$1325

Hewlett Packard

Deskjet Portable, 300dpi, 3ppm	$299*
Deskjet 500, 300dpi, 3ppm	339
Deskjet 500C, 300dpi, 3ppm	469
Deskjet 550C, 300dpi, 3ppm	669
Scanjet IIC (w/ interface kit)	1245
Laserjet IIIP, 300dpi, 4ppm	$829
Laserjet 4, 600dpi, 8ppm	1315
Deskjet 4M, 600dpi, 8ppm	1815
Scanjet IIP (w/ interface kit)	745

*price after rebate

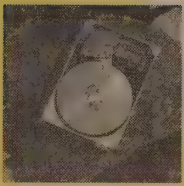
OKIDATA

OL-400, 300dpi, 4ppm	$475*
OL-810, 300dpi, 8ppm	928
OL-830, 300dpi, 8ppm	1160
ML-184,9-Pin, 300cps	277
ML-320, 9-Pin, 300cps	319
ML-321, 24-Pin, 450cps	435
ML-520, 24-Pin, 450cps	375
ML-521, 24-Pin, 450cps	495
ML-590, 24-Pin, 450cps	445
ML-591, 24-Pin, 450cps	598
ML-593, 24-Pin, 450cps	959

*price after rebate

EPSON

LX-810, 9-Pin, 200cps	$169
LQ-570, 24-Pin, 315cps	239
LQ-870, 24-Pin, 413cps	449
LQ-1070, 24-Pin Wide, 315cps	359
LQ- 1170, 24-Pin Wide, 413cps	625
FX-870, 24-Pin, 330cps	279
FX-1170, 24-Pin, 330cps	369
EPL 8000, 300dpi, 10ppm	859
Stylus 800 Inkjet, 300cps	379
ES600C Image Scanner (w/Interface Kit)	1125
ES800C Image Scanner (w/Interface Kit)	1395
Action Laser 1000, 300dpi, 6ppm	625



Conner or Maxtor

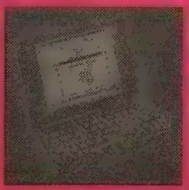
120MB Hard Disk Drive

$195

Maxtor 7245

245MB Hard Disk Drive, 64K Cache, 15ms

$269



OmniBook 300

$2195

$1895

HEWLETT PACKARD

Maxtor

7130, 130MB, 15ms	$195
7213, 210MB, 15ms	235
7245, 250MB, 12ms	269
345MB, 12ms	365
550MB, 12ms	785

Seagate

40MB, 19ms	$145

Conner

80MB, 19ms	$175
120MB, 16ms	195
175MB, 17ms	235

Western Digital

200MB, 15ms	$235
250MB, 12ms	269
340MB, 12ms	365

Fujitsu

550MB, 12ms	$785

Micropolis

1624, 760MB SCSI2, 15ms	$795
1596, 1GB SCSI2, 14ms	1250
1528, 1.3GB SCSI2, 15ms	1345
1908, 1.5GB SCSI2, 14ms	1695
1508 1.7GB SCSI2, 14ms	1775
1924 2GB SCSI2, 14ms	1995
2105 560MB IDE	855
2105 560MB SCSI	810
2112 1.2GB IDE or SCSI, 10ms	1040

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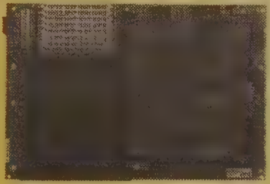
UPGRADE YOUR SYSTEM TO A
VESA LOCAL BUS SYSTEM FOR ONLY



$245

*INCLUDES 32-BIT VESA LOCAL BUS GRAPHICS CARD W/CIRRUS LOGIC CHIP SET

VESA LOCAL BUS CONTROLLER CARDS

32-Bit cache controller w/64K cache upgradable to 16MB	$179
Ultrastor 32-Bit SCSI Cache Controller w/64K Cache	295

VESA Local Bus Motherboards

486/33Mhz w/CPU	$445
486/50Mhz w/CPU	585
486/66Mhz w/CPU	685

Motherboards

386SX/40 w/CPU	$115
386DX/40 w/CPU	159
486SX/33 w/CPU	310
486DX/33 w/CPU	415
486DX/50 w/CPU	545
486DX/66 w/CPU	645

VESA Local Bus Graphics Cards

32-Bit Cirrus Logic w/1MB	$95
32-Bit Diamond Stealth w/1MB	189
32-Bit Orchid Fahrenheit w/1MB	189
32-Bit Orchid Fahrenheit w/1MB (VA)	219
32-Bit Diamond Viper w/2MB	459
32-Bit Orchid P9000 w/3MB	489
32-Bit Genoa w/1MB	125

Graphics Cards

Trident w/512K	$39
Trident w/2MB	65

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RESOURCES

Calendar Of Events

CONFERENCES, SHOWS, AND OTHER SPECIAL EVENTS

AUGUST

August 7–8 Computer Show With Computer Training Seminar. LA Fairgrounds, Pomona. Computer Marketplace. Call: 1-800-800-5600.

August 8 Computer Show & Sale. Scottish Rite Center, San Diego. MarketPro Shows. Call: (415)388-8893.

August 14 Computer Show & Sale. CSUN, North Campus. Richard James Corp. Call: 1-800-433-7469.

August 15 Computer Show & Sale. Civic Auditorium, Oxnard. MarketPro Shows. Call: (415)388-8893.

August 19–21 Fourth Annual Macintosh Summit Conference. Santa Barbara. UCSB Extension. Call: (805)893-3351. AOL: MacSummit.

August 21 Computer Show & Sale. Anaheim Stadium, indoors. Richard James Corp. Call: 1-800-685-1400.

August 21–22 Computer Swap Meet & Sale. Long Beach. Megabyte Computer Shows. Call: 1-800-745-0266.

August 22 Computer Show & Sale. Industry Hills Sheraton. Richard James Corp. Call: 1-800-685-1400.

August 22 Computer Swap. Anaheim Marketplace. Silicon Avenue. Call: (714)680-0828.

August 26–27 Electronic Book Fair. San Francisco. Sumeria, Inc. Call: (415)904-0811.

August 28 Computer Show With Computer Training Seminar. LA Fairgrounds, Pomona. Computer Marketplace. Call: 1-800-800-5600.

August 30–31 Information Technology Summit—Fall '93. Midway, UT. UITA. Call: (801)944-1500.

SEPTEMBER

September 4 Computer Show & Sale. Ventura County Fairgrounds. MarketPro Shows. Call: (415)388-8893.

September 5 Computer Show & Sale. Glendale Civic Auditorium. Richard James Corp. Call: 1-800-685-1400.

September 5 Computer Show & Sale. Scottish Rite Center, San Diego. MarketPro Shows. Call: (415)388-8893.

September 9–11 CompuExpo '93. Las Vegas Convention Center. UNSC Investment Group. Call: 1-800-822-1229.

September 10–12 San Diego Computer Fair 1993. San Diego. San Diego Computer Society. Call: (619)573-0617.

September 11 Computer Show. Sherman Entertainment Center, Reseda. Computer Marketplace. Call: 1-800-800-5600.

September 11–12 Computer Show & Sale. CSUN, North Campus. Richard James Corp. Call: 1-800-685-1400.

continued on page 118

AUGUST 21–22

COMPUTER SWAP AND SALE

Long Beach Convention Center

Megabyte Computer Shows is having computer swap meet and sales events at the Long Beach Convention Center, 300 E. Ocean Blvd. Admission is $5 and shows are from 10:00 am to 3:30 pm. Call: 1-800-745-0266.

AUGUST 22

COMPUTER SWAP

Anaheim Marketplace

Silicon Avenue will host its first computer swap meet in the parking lot of the Anaheim Marketplace. Over one hundred wholesalers and vendors will be selling computer systems, hardware, software, and accessories at wholesale prices to the public. Both admission and parking is free and prizes will be given away throughout the day. The swap meet is from 8:00 am to 2:00 pm at 1440 S. Anaheim Blvd., at Cerritos Ave. between Katella and Ball. Call: (714)680-0828.

AUGUST 28

COMPUTER SHOW

Pomona

Computer Marketplace computer shows feature over three hundred exhibits with thousands of products. They are now featuring seminars open to all users—from the beginner to the advanced computer user. Admission is $7.00 and shows are from 10:00 am to 5:00 pm. Los Angeles County Fairgrounds (Fairplex), Pomona. Call: 1-800-800-5600.

SEPTEMBER 10–12

SAN DIEGO COMPUTER FAIR 1993

San Diego Concourse Convention & Performing Center

Jazz, Karaoke, animation, computers, and more will be at the San Diego Computer Fair 1993. Keynote speakers feature Timothy Turnpaugh, president and CEO, Egghead Software and Gordon Ubanks Jr., president and CEO, Symantec Corp. Seminars on a wide range of topics will include Windows, Ergonomics, Desktop Video Virtual Reality, and Fuzzy Logic. Exhibits will also give you an opportunity to explore such things as Pen Computing, Computer Therapy, Tracing Your Family History, Making Movies, and much more. For information and registration, call: (619)573-0617.

Computer MARKETPLACE

COMPUTER TRADE SHOW
WHOLESALE PRICES
OPEN TO THE PUBLIC

10:00 to 5:00 p.m.
Admission $7.00

"The Traveling Mall That Has It All"

Pomona Shows
FREE SEMINARS
300 EXHIBITS

Over a hundred companies having price wars with each other to compete for your business. You can't find this much inventory in a hundred computer stores nor can you get these prices. There is also a consignment table to sell your computer equipment.

1993 SHOW DATES

August 28
Saturday
POMONA - Fairplex (L.A. County Fairgrounds)
Exit Highway 10 at Fairplex Drive. Go North to Mckinley, turn right. Turn Left on White Avenue to Gate 14.

September 11
Saturday
RESEDA - Sherman Entertainment Center
From 101 Freeway, take Reseda off ramp, turn left (if traveling East) on Reseda Blvd. to Sherman Way, turn right, one block to Canby Street. 18430 Sherman Way.

September 12
Sunday
BUENA PARK - Sequoia Conference Center
Take the Beach Blvd. Exit off the 91 Freeway, go one block North to 7530 Orangethorpe.

October 2
Saturday
RESEDA - Sherman Entertainment Center

October 3
Sunday
BUENA PARK - Sequoia Conference Center

October 9 & 10
Saturday & Sunday
POMONA - Fairplex (L.A. County Fairgrounds)

OS/2 SEMINAR
BY IBM
AUGUST 28TH

TRAINING SEMINARS

Co-sponsored with New Horizons

FREE Computer Training Seminars are scheduled at all Pomona Shows!

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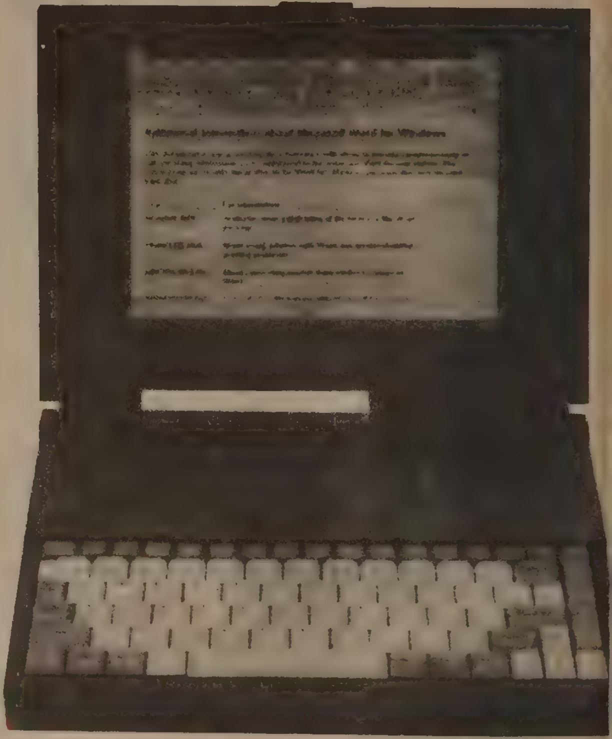
Intelligent 486DX Power

486DX/DX2 VESABook – Unbelieveable Single PC Solution!



- Physical: 11"(W) x 8.6"(D) x 1.9"(H); 6.6 lbs w/battery
- 10" TFT Active 256 Colors or 64 Gray Scales Mono LCD
- Intel 486DX™ 33Mhz or Intel 486DX2™ 66Mhz CPU w/built-in 8K Cache Memory and Math Coprocessor
- 32 Bit VESA Local Bus Technology
- 4MB RAM on board, Expandable to 8 or 20MB
- 120KB External Cache Memory
- One Type III PCMCIA IC Card Slot (Two Type II Slots)
- Built-in track ball pointing device
- Intelligent Resume/Suspend Power Saver Utilities
- Rechargeable Ni-Cad Battery & Unverisal AC/DC Adaptor
- Battery Life (w/power saver): 2 hours active color, 3 hours mono
- Support External Super VGA Monitor simultaneously
- 200-Pin Local Bus Port for SCSI VESA-Station
- Serial, Parallel, VGA, PS/2 Mouse, Keyboard Ports
- MS-DOS 6.0, and carrying case

Performance Priced To Go.........

	Active Color	Mono
DX-33	$3650	$2050
DX2-66	$3850	$2350

486DX/DX2 Patriot

Reliable & Inexpensive Portable Power!

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- 10" 64 Gray Scales Supertwist Backlit Monochrome LCD
- Intel 486DXTM 33MHz or Intel 486DX2TM 66Mhz CPU w/Built-in 8K Cache Memory and Math Coprocessor
- 4MB RAM on board, Expandable to 8 or 20MB
- Built-in 1.44MB High Density Floppy Drive
- 120MB 13ms Hard Drive (200MB Optional)
- Built-in Track Ball Pointing Device
- Built-in 24/96 Send/Receive Fax/Modem (Optional)
- Intelligent Resume/Suspend Power Saver Utilities
- Rechargeable Ni-Cad Battery & Universal AC/DC Adaptor
- Battery Life (w/Power Saver): 2.5 Hours
- Support External Super VGA Monitor Simultaneously
- Serial, Parallel, VGA, PS/2 Mouse, Keyboard Ports
- 200-Pin AT Bus Port for Docking Station
- MS-DOS 6.0, and carrying case

DX-33	$1750
DX2-66	$1999

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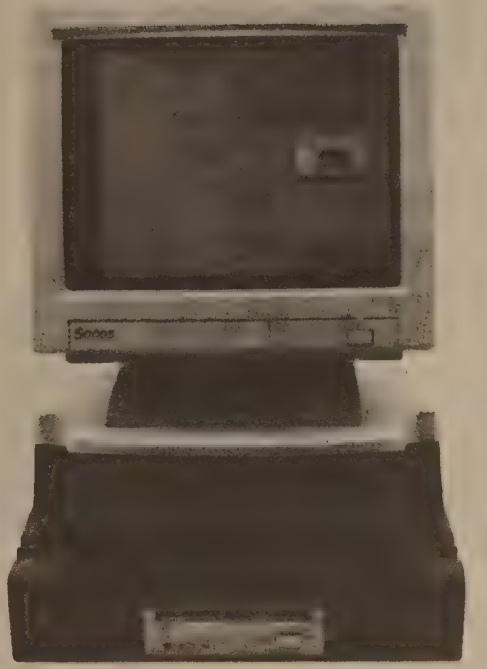
SCSI VESA-Station — Designed for Windows NT™ & Multimedia

ISG's VESABooks and SCSI – VESA Stations will make Desktops Obsolete!

SCSI VESA Station:

- Physical: 14.5"(W) x 14.4"(D) x 4.9"(H)
- Weight: 10 lbs. (Approximately)
- Solid Platform for a monitor up to 20"
- Eight-layer mainboard
- 32-Bit VESA Local Bus Expansion Port
- Two 32-Bit VESA and Four 16-Bit ISA Slots
- Built-in Future Domain SCSI BIOS
- One 5.25" Drive Bay for SCSI CD-ROM
- Two 1" high 3.5" Drive Bays for two 1" SCSI Drives (120MB to 540MB) or one full size SCSI Drive (Up to 2GB or more)
- Transfer Rate on SCSI Drive: 10 to 20MB/ms
- Compatible w/most VESA Video Cards (Call INSI to receive a testing report)
- Two Internal High Quality Stereo Speakers
- Sub-system Ports: Two Serial, One Parallel, One External 25-Pin SCSI, One PS/2 for External Keyboard/Mouse and One SVGA



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1 Year Parts
2 Years Mainboard & Hardrive
3 Years Labor

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- Intel 486™ Micrcprocessor
- Built-in Math-CoProcessor (DX or DX2)
- AMI BIOS w/System Setup Utilities
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- Middle Tower Case & Digital Display
- 256K 20ns Cache Memory
- 4MB 70ns RAM Expendable to 32MB
- IDE Controller & 2 Serial/Parallels/Game Ports
- 1.2 & 1.44MB Floppy Drives
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- VESA 32 Bit 16.7m Color 1280 Ultra VGA w/1MB
- 14" SVGA Monitor (0.28mm, 1024x768 NI)
- 101-Key Enhanced Keyboard
- Free Hi-Resolution 3-Button Mouse
- Free Microsoft DOS 6.0 & Windows 3.1

486DX-33.......... **$1599**
486DX-50.......... **$1739**
486DX2-66........ **$1849**

ISA 486 PCs

- Intel 486TM Microprocessor
- Build-in Math-CoProcessor (DX or DX2)
- AMI BIOS w/System Setup Utilities
- 230W UL Rated Power Supply
- Mini Tower Case w/Digital Display
- 256K 20ns Cache Memory
- 4MB 70ns RAM Expendable to 32MB
- IDE Controller & 2 Serial/Parallel/Game Ports
- 1.2 & 1.44MB Floppy Drives
- 245MB 15MS Hard Drive
- SVGA Card w/1MB RAM
- 14" SVGA Monitor (0.28mm, 1024x768)
- 101-Key Enhanced Keyboard
- Free Hi-Resolution 3-Button Mouse
- Free Microsoft DOS 6.0

486DX-33 .... **$1439**
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- Stereo Production and Playback of Sounds from Four Sound Sources.
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- 16Bit Built in at CD-ROM Interface.
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CD-ROM

Disk Format:	IS09600
Disk Capacity:	630MB
Data Transfer:	175KB/SEC.
Data Transfer "Burst":	1.6MB/SEC.
Access Time:	350MS "1/3 Stroke"
Interface:	At
Memory Buffer:	32KB
Frequency Response:	20Hz to 20 KHz
MTBF:	250000H

Software

Windows 3.1 Drivers, Windows Digital Audio Transport, Monologue, Sound Script, Jukebox, Sound Tracks and Microsoft CD Extension.

CD Titles

Toolworks Multimedia Encyclopedia: 21 Volume Set. 33,000 Pictures, 35 Minutes of Video, 35 Minutes of Sounds and 250 Maps.
World Atlas: 240 Detailed VGA Color Maps. Data of Every Country in the World.
US Atlas: Full Color Maps of All States.
Game Pack II: Chessmaster 2100, Bruce Lee, Life & Death, Beyond the Black Hole, Loopz, Cribbage King, Puzzle Gallery, Backgammon, Robot Tank, Gin King.

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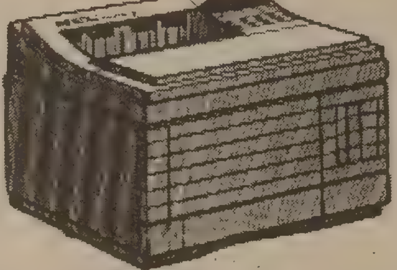
COMPUTER SUPERSTORE

HP LASERJET 4



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- Ideal for Windows environment

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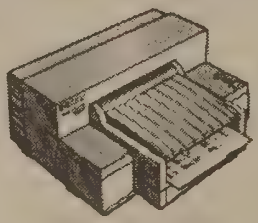

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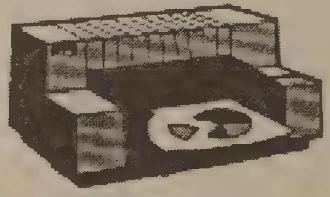

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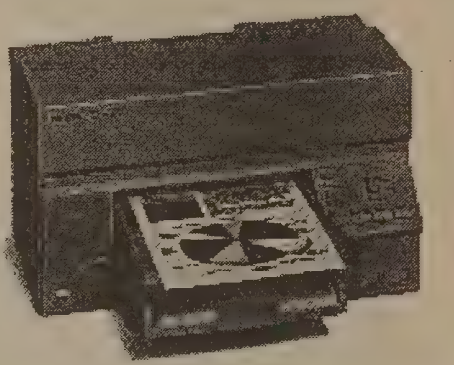

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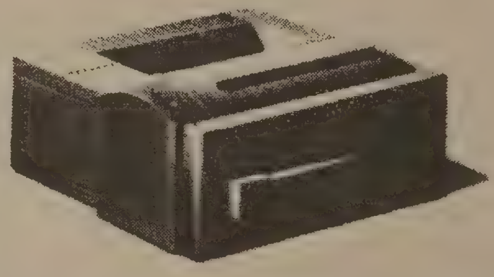

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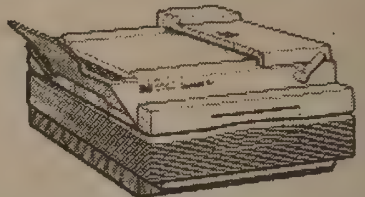

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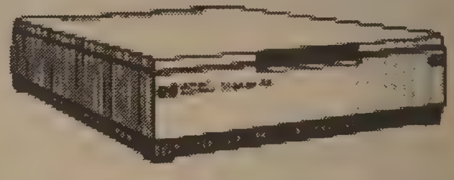

- 8 bit Grayscale
- Image editor
- Full page scan

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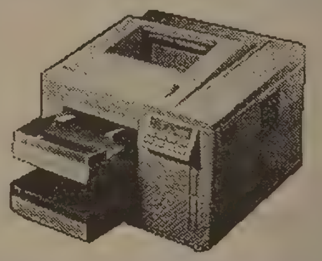
HP LASERJET 4si



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intel inside

GST 486DX2/66MHz

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- 230 MB Hard Drive
- 64K Cache Memory
- FDC/HDC IDE Card 1:1
- 1.2M & 1.44M Floppy
- 2 Serial/Parallel ports
- SVGA Monitor w/1MB SVGA Card
- 101 Enhanced Keyboard
- MS DOS 6
- MS Windows 3.1
- Mouse

GST 486DX/50MHz

- 4MB RAM
- 230 MB Hard Drive
- 256K Cache Memory
- FDC/HDC IDE Card 1:1
- 1.2M & 1.44M Floppy Drive
- 2 Serial/Parallel ports
- SVGA Monitor w/1MB SVGA Card
- 101 Enhanced Keyboard
- MS DOS 6
- MS Windows 3.1
- Mouse

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BULLETIN BOARDS

MULTI-ZONE

The Annex. (213)971-4686; (310)388-3818; (818)786-5600. 8-N-1, 1200/2400/9600/14,400. Multiline, games, chat, CD-ROMs, matchmaking, and friendly. Sysop: Gregory Gooden. [Exp. #114.]

Aussie BBS. (818)337-9701, (909)598-2502. 8-N-1. 10 lines, chat, games, highest quality adult GIFs, 18,000 files, and more. Sysop: Mike Szabados. [Exp. #112.]

Barter Exchange. (805)373-3871; (818)999-1829, 879-8547, 787-6408, 557-0432. Multiline BBS, 1GB adult file library, multimember chat arena. Age 21 and over. [Exp. #113.]

BaudTown BBS. (213)294-7791, (805)259-5442, (805)584-9680, (818)893-0340, and others. 24 hrs. 32 conference lines, chat, matchmaker, databases, library, and more. [Exp. #112.]

CPI BBS.(213)566-3004, (310)366-7472, (818)281-5760. 8-N-1, 24 hrs., 1200/2400/9600/14,400. 10 lines, nationwide mail, echo conferences, matchmaker, multiuser games, files, and more. All ages welcome. Free trial. [Exp. #112.]

Crystal Palace. (310)472-2598, (818)765-2171. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. 15GB of GIFs, stories and shareware on CD-ROM, netmail, active msg database, matchmaker, doors, games. Sysop: Daniel Mathis. [Exp. #114.]

Easy Street. (714)778-5473; (904)590-4307. 14,400. 7GB of files, live multi-chat, interactive games. Access numbers throughout Orange County. [Exp. #113.]

Entertainment & Consumers Network. (310)204-6007; (818)784-3039, 760-3828, 888-3942. 8-N-1, 24 hrs., 300/1200/2400. New Internet mail and newsgroup services available w/free trial memberships. [Exp. #113.]

KBBS Los Angeles. (213)725-3047, (310)558-0145, (818)886-0872. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. Multiplayer games, 2.5GB of shareware, Internet, global group chat. Free trial [Exp. #113.]

Modem Butterfly. (213)264-6900, (310)767-1010, (714)828-5500, (805)581-0700, (818)798-9900, 842-6900, 887-7900. 8-N-1, 1200/2400/9600. Instant access, 1GB, SIGs, 33 conference lines, events, trivia contests. Sysop: Karyn Zoldan. [Exp. #112.]

The Motherboard. (213)656-9339, (310)421-3767, (714)521-1175, (805)520-2300, (805)287-5957, (818)781-7834. 8-N-1, 24 hrs., 300/1200/2400. 32 lines, multiuser/group & private chats, 2GB, email, public forums, library, and matching. More local numbers available online. Sysop: Celeste Clark. [Exp. #113.]

Tycho's Computer Express. (310)493-6402, (714)638-8149. 8-N-1, 24 hrs., 1200/2400. Private/group chats, msgs, mail, parties/socials, six lines. Free. Sysop: Adam Judd. [Exp. #113.]

VVBBS—Valley Village BBS. (213)628-9640, (310)276-9970, (818)763-8160. 8-N-1, 24 hrs., 16,800. 40+ new files every day, great games, friendly sysop. Free trial. [Exp. #114.]

The Westside. (213)933-4050, (714)663-9531 90 lines, chat, online games, GIFs, animations, shareware, social events, and more. Free 25- call Trial for mentioning *MicroTimes.* [Exp. #113.]

213

The Career Network. (213)629-1472. 5 pm–1:30 am, 300/1200/2400. Job hunting. Your resume can reach over 250 major employers each month. Sysop: Steven McCormick. [Exp. #112.]

LAAUGLine. (213)387-1002. 24 hrs., 300/1200/2400. Amiga. Sysop: Thom Irwin. [Exp. #112.]

Megabytes BBS. (213)221-6379, 223-6901. Windows shareware files and DOS files. Free trial, instant access. Sysop: William Rivas. [Exp. #114.]

US Pompeii/InfoTran Networks. (213)878-2801. 8-N-1, 24 hrs., Local and int'l BBS, 32 lines, chats, pubs, games. One month free trial. Sysop: Zippy Manus. [Exp. #112.]

Valley Computer Club (VCC). (213)227-9684. 8-N-1, 1200/2400/9600. Sysop: Wes Arnold. [Exp. #113.]

310

Close Encounters. (310)947-3997, 902-9538. 24 hrs., 300/1200/2400. Local to many 714, 213, and 818 areas. Multiline social interaction system. [Exp. #112.]

Compu-Net! BBS. (310)822-0038. So. Cal's largest file and msg board. CD-ROMs, dating, adult, Windows, IBM, UFO, Mac, and more. [Exp. #113.]

Ground Zero BBS. (310)430-0079. 300–16,800. 3 lines, Windows, OS/2, 39,000 files, QWK mail, RIME and U'NI networks. Sysop: Rick Edwards. [Exp. #112.]

LA Computer Society BBS. (310)827-8171. 8-N-1, 24 hrs., 2400 only. Full access to Computer Society members ($36/yr), message bases, SIGs, and club information. Sysop: Frances Ames. [Exp. #112.]

LAMG (Los Angeles Macintosh Group). (310)559-MACS. 8-N-1, 24 hrs, 300/1200/2400/9600/14,400. So. Cal's busiest all Mac multiline BBS. 300MB of Mac news, reviews, rumors, and more. [Exp. #112.]

La Mirada's The Modems Delight BBS. (310)944-1221. 24 hrs., 300/1200/2400/9600. Multi-interest files, doors, games, and fun. Echomail, 1:102/430 FidoNet/RimeNet 5149. Sysop: Ronald Dishon. [Exp. #114.]

Mac-HAC'ers BBS. (310)549-9640, 549-9664. 8-N-1, 24 hrs., 16,800. All computers, over 5GB of programs, six CD-ROMs, international mail. You validate yourself. Sysop: Bud Grove. [Exp. #114.]

Moroni BBS. (310)392-3981. 24 hrs., 300/1200/2400/9600. LDS-oriented, 650MB shareware. Free. [Exp. #112.]

MortgageNet BBS. (310)598-6054. 8-N-1, 24 hrs., 300/1200/2400/9600. Online pre-qualifying, interest rate updates, loan programs, repo's/foreclosures. Free. Sysop: Dennis Loput. [Exp. #114.]

the original off off-broadway BBS. (310)453-7038. 8-N-1, 24 hrs., 300/1200/2400/9600. Non-subscription, text files/messages only. Using MajorBBS software and CompuCom Speedmodem. Sysop: James Gossage. [Exp. #112.]

PS&A Beach Cities BBS. (310)374-9994. 14,400. DOS, Windows, OS/2, Mac, Amiga, DESQview. No fees. Sysop: Paul Swanno. [Exp. #113.]

Service Bureau BBS. (310)793-8739. 8-N-1, 24 hrs., 2400. Drivers and utils available to be downloaded. Bulletins on new and used products, service referrals. Sysop: Wayne Smith. [Exp. #114.]

Skeleton Crew BBS. (310)306-5134, 306-9775. 24 hrs., 57,600. Shareware, Public Domain, adult GIFs, games, Intelec, MetroNet, RoseNet, and Science Factor. Sub. plans available. Sysop: Bruce Vigil. [Exp. #112.]

South Bay Apple Macintosh Users Group (SBAMUG). (310)792-8083. First class, GUI. [Exp. #112.]

The Spider's Web BBS. (310)416-9901. 300/1200/2400/9600/14,400. Child abuse, recovery, men's issues, spirituality, space, science, and ecology. FidoNet. Free. Sysop: John Elder. [Exp. #114.]

Starlight BBS. (310)830-5798. Net mail, Paradox 4.0, Windows, OS/2, C++ Programming, finance, astronomy forums, more. Free. [Exp. #114.]

Xchange Net. (310)452-3374. 8N1 Totally classified ads, totally free. [Exp. #112.]

714

Alzheimer's BBS Of O.C. (714)731-3045. 8-N-1, 24 hrs., 2400. Info on day care, support groups, respite care services, articles, and related info. Non-sub, text file and msgs only. Sysop: Vladim Ostapowicz. [Exp. #112.]

Astronomy BBS. (714)738-4331. 2 lines, space GIFs, weather sat images, planetarium progs. AMSAT Keplarians, NASA news. [Exp. #112.]

Commodore Computing. (714)673-2185. 8N1, 24 hrs., 300/1200/2400. Supports C64/128. Free. Sysops: Stephen Fabre/Jay Darrow. [Exp. #112.]

Controversy Now! (714)821-4548. 2400/9600/14,400. Multi CD-ROMs, two nodes, VGA Planets, 2GB online. Sysop: Larry Xikis. [Exp. #114.]

Diaspar Virtual Reality Network. (714)831-9101 (2400), 362-9995 (9600). Home EduTainment Center, 20+ lines, experience virtual reality. Sysop: David Mitchell. [Exp. #114.]

Direct Data Source BBS. (714)538-3065. 8-N-1, 300/1200/2400/9600/14,400. Chat, 14,000+ files, echo mail, live games. Sysop: Justine Guthrie. [Exp. #113.]

Continued

BBS Spotlight

By John Wolcott

Getting To The Point With Carrier Point Information

The number of subscription BBSes available to Southern California users continues to grow. It's really a win-win situation. There is a considerable demand for well-run subscription bulletin boards enabling system operators to profit from what they love to do. There is definitely a need for the service among those who seek both entertainment and access to the latest shareware and public domain files. Choice of a BBS amounts to personal preference for system features and appearance. This month's BBS Spotlight focuses on a BBS with a somewhat unique appearance and a plethora of features.

CPI BBS, or properly, Carrier Point Information Bulletin Board Service, has been online a little over a year. It doesn't have a catchy name, but among subscription BBS services, it does offer premium features. Sysops Mark Bishop and Bella Chan believe that in order to compete in today's BBS market, they need vision; realizing that it's the quality of online service and information that makes the difference.

CPI BBS is supported by ten telephone lines. It's quite apparent that some BBS setup expertise has contributed to presenting a professional delivery to callers. The only drawback to this well-delivered appearance is a tax on your patience if you're running a 2400 baud modem and some redundancy in menu selections. Redraws of menu screens can seemingly take forever. If you're connected with a higher speed modem, it is (mostly) painless.

Your first stop at CPI BBS is a bulletin help menu with information on various system features, local calling area telephone numbers, use of Macintosh and Apple computers on the system, and information for the new IBM/shareware library. After you've read a selected help bulletin, it erases itself from the bulletin menu and won't bother you again.

An appealing ANSI display will give you main menu selections as well as guide you through submenus in color with easy-to-use dialog selection boxes. From the main menu, BBS features you may select are classified and personal ads; chat and entertainment; file libraries for IBM compatibles; Macs and GIFs; the *USA Today* newspaper online; a business and information menu; a user system utility menu; membership information; a young adult section; matchmaking; and electronic mail. The menu is also appointed with exciting online games, nationwide Echo Mail, and anti-virus support.

The classified and personal ads contain a modestly sized listing of ads from other system users. There are nineteen different advertisement categories for everything from computers to antiques. You'll also find "wanted" categories for roommates, jobs, and computers. There's even an "Upcoming Yard Sales" section. Choosing one of these categories will present you with an ad title list to select from.

Chatting online can really be a pleasure as you meet

Continued

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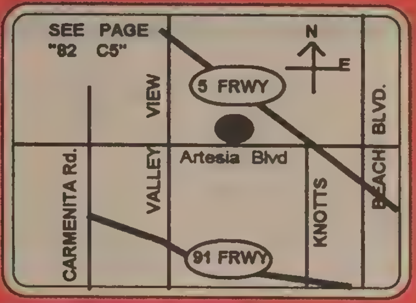
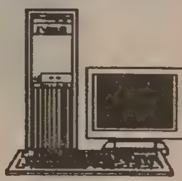


K-NET 486DX ISA Deluxe System

- * ***INTEL*** 486DX/486DX2 CPU
- * Internal i487 Math Coprocessor
- * Heat-Sink w/ Fan for 50MHhz/66Mhz
- * **4 MB** Memory Exp. to 32MB
- * ***256 K Fast Cache*** Memory
- * **170MB** Hard Drive
- * ***TEAC* 1.2 & 1.44** MB Floppy Drive
- * Deluxe Mini Tower or Desktop Case w/ PS
- * ***Graphic Accelerator*** Card w/ **1MB RAM**
- * Super VGA Monitor,***.28 Dot Pitch,1024x768, Edge to Edge***
- * IDE Floppy / Hard Disk Controller Card
- * 2 Serial / 1Parallel / 1Game Port
- * 101 Enhanced Keyboard

486DX-33Mhz..................$1248
486DX-50Mhz..................$1408
486DX2-66Mhz...............$1488

K-NET 486DX 32 Bit VESA Local Bus System



- * ***INTEL*** 486DX/486DX2 CPU
- * **4 MB** Memory Exp. to 32MB
- * Internal i487 Math Coprocessor
- * ***256K Fast Cache*** Memory
- * ***170 MB*** Hard Drive
- * ***TEAC* 1.2 & 1.44** MB Floppy Drive
- * ***32 Bit VESA Local Bus IDE Controller Card***
- * ***32 Bit VESA Local Bus Accelerator Video Card*** w/ **1MB**
  - *(16.7M True Color Display & up to 1280x1024)*
- * Deluxe **Middle** Tower Case
- * ***Non-Interlaced*** SuperVGA Monitor ***.28dp, 1024x768***
- * 2 Serial / 1 Parallel / 1 Game Port
- * 101 Enhanced Keyboard

486DX-33Mhz..$1348 ***486DX2-66Mhz..$1588***

** 245MB Hard Disk +$55*
** 340MB Hard Disk +$140*
** S3 Accelerator Vesa Local Bus Vedio Card w/1MB+$59*
** Diamond Stealth 24 Vesa LB Video Card w/1MB +$69*
** Orchid Fahrenheit Vesa LB Video Card w/1MB +$79*
** 14" VESA standard, Non-Interlaced Super VGA Monitor 1280x1024,70Hz,.28dp.....................+$35*
** 15" Flat screen, Non-Interlaced Super VGA Monitor 1280x1024,70Hz,.28dp.........................+$120*
** 17" Flat screen, Non-Interlaced Super VGA Monitor 1280x1024,72Hz,.28dp.........................+$560*

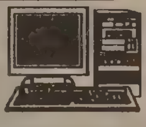
K-NET 386DX-40Mhz 128K Cache System

- * AMD 386DX-40Mhz CPU
- * **4MB** Memory Exp.32MB
- * ***128K Fast Cache*** Memory
- * ***120MB*** Hard Drive
- * **TEAC 1.2 & 1.44** MB Floppy Drive
- * Deluxe Mini Tower or Desktop Case
- * ***Graphic Accelerator*** Card w/ **1MB** RAM
- * Super VGA Monitor ***(1024x768, Edge to Edge)***
- * Floppy / Hard Disk Controller
- * 2 Serial / 1 Parallel / 1 Game Port
- * 101 Enhanced Keyboard

Best for Student!!

$925

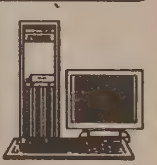
K-NET 486SLC2-50 Deluxe System



- * IBM 486SLC2-50Mhz CPU
- * **4 MB** Memory
- * ***64 K Fast Cache*** Memory
- * Math Coprocessor Included
- * ***120MB*** Hard Drive
- * **TEAC 1.2 & 1.44** MB Floppy Drive
- * Deluxe Mini Tower or Desktop Case
- * ***Graphic Accelerator*** Card w/ 1MB RAM
- * Super VGA Monitor ***(1024x768, Edge to Edge)***
- * Floppy / Hard Disk Controller
- * 2 Serial / 1Par. /1Game Port
- * 101 Enhanced Keyboard

$1188

K-NET 486DX *EISA* VESA Local Bus System



- * ***INTEL*** 486DX/486DX2 CPU
- * **4 MB** Memory Exp.32MB
- * Built-in Math Coprocessor
- * ***256K** Fast* Cache Memory
- * ***245MB*** Hard Drive
- * 101 Enhanced Keyboard
- * Deluxe **Middle** Tower Case
- * ***32 Bit VESA LB Accelerator Card*** w/ **1MB**
  - *(16.7M Color & up to 1280x1024)*
- * ***32 Bit VESA Local Bus IDE Controller***
- * ***15" FLAT Screen Non-Interlaced .28dp***
  - SuperVGA Monitor ***,1280x1024, 70Hz***
- * **TEAC 1.2 & 1.44** MB Floppy Drive
- * 2 Serial / 1 Parallel / 1 Games port

486DX-33Mhz........$1698
486DX2-66Mhz.....$1898

K-NET PRODUCT LINE

Printers:

HP DeskJet 500/500c/550c.....	$ Call for
HP LaserJet 4L / 4LM/ IIIP.........	$ Best
HP LaserJet 4/ 4M..................	$ Price
CANON Bubble Jet 10ex...........	$ 245
CANON Bubble Jet 200.............	$ 329

EPSON, Panasonic, OKIDATA, and more selection for dot matrix printers..!!

(Cash price for all of the advertised printers)

Multimedia:

Mitsumi CD-ROM (350ms)...	$ 195
Sound Commander Pro	$ 105

(w/speakers & software)

Media Pack # 1:

Sound Commander Pro Multimedia Upgrade Kit.............................$ 395

(Mitsumi CD-ROM Drive, Speakers, Remote Controller & Receiver, Sound Commander Pro, Bundled Software, 4 CD Titles)

Media Pack # 2:

Multimedia Kit..........................$ 385

(Panasonic CD-ROM Drive(390ms), Sound Blaster Pro Card, and 5 CD Titles)

Network products:

Netware Lite w/ Dr. 6.0........	$65.00
NetWare V3.11 5 User........	$590.00
NetWare V3.11 10 User........	$1345.00
NetWare V3.11 20 User........	$1850.00
NetWare V4.0 5 User........	$930.00
NetWare V4.0 10 User........	$2090.00
NetWare V4.0 25 User........	$3090.00
16 Bit Ethernet Card........	$72.00
10Bast-T Ethernet Combo Card........	$85.00
RG 58 Ethernet Cable............	$.30 per ft.
BNC Connector.......................	$2.50
BNC Terinator...........................	$3.00
T-Connector....................................	$2.00

MAG **Monitor:**

15" (MX15H),1280x1024,72hz,.28...	$535
17" (MX17H),1280x1024,72hz,.28...	$965

Shamrock **Monitor:**

14" (1451),1024x768,SVGA .39dp...	$205
14" (1451),1024x768,SVGA .28dp...	$235
14" 1024x768,Non-Interlaced,.28dp.	$265
14" N-I VESA Std.1280x1024,.28....	$290
15" N-I Flat Screen,1280x1024,.28...	$395

Misc:

Colorado 120MB Tape Backup.......	$189
Colorado 250MB Tape Backup.......	$205
120/250MB Tape Cartridge..................	$18
2400 Internal Modem.......................	$30

96/96/24 FAX Modem......$55
(w/ Windows Software)

14.4/14.4 Send/Rec. Fax Modem....	$165
AT SuperIDEw/IO(2S,1P,1G)Controller..	$17
VESA Local Bus IDE Controller....	$45
VLB IDE Cache Ctrl.w/0K Exp.16MB.	$185
Mini Tower Case w/230W power supply.	$50
Desktop Case w/230W power supply..	$55
Mid.Tower Case w/230W power supply.	$70
Mid.Tower Case w/ Door&250W PS..	$85
Full Tower Case w/250W power supply..	$90
Trackball..............................	$30
Hi-Resolution Mouse.....................	$10
Heat - Sink w/Fan.....................	$18

Microsoft Serial Mouse....$49
(New Shape)

Free Mouse
With System Purchase

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**All systems carry 1 year parts & labor limited warranty
**Price subject to change without notice
**15-day money back guarantee w/15% restocking fee on ressaleable condition

Infinity BBS. (714)379-1335. 8-N-1, 300/1200/2400/9600/14,400. 20 lines, 3GB file library w/adult GIFs, teleconference, email, games, FidoNet. Sysop: Eric Robitaille [Exp. #113.]

InfoMat BBS. (714)492-8727. Intelec, RaceNet, OCIN, and P&BNet msgs. Game doors. Book, job, and franchise listings. Free. Sysop: Michael Gibbs. [Exp. #114.]

Kaiwan. (714)539-5726, 539-7436. 7-E-1, 24 hrs., 1200/2400/9600/14,400/16,800. Internet/UNIX, FTP/Telnet, email, news, no time limit. $10/mo. Login: guest. Sysop: Kailan Hwang. [Exp. #112.]

LAX Matchmaker. (714)895-5862. 8-N-1, 24 hrs., 300/1200/2400. Internet email, matching, chat, Holodeck, GIFs. [Exp. #112.]

The Master Connection BBS. (714)651-9815. 24 hrs., 1200–16,800. Games, utilities, graphics. No fee. Sysop: Mark Duvall, Jr. [Exp. #112.]

The Master Cylinder. (714)738-3677. 300/1200/2400/9600/14,400. 800MB, 3 CD-ROMs, WildNet node, p/d files online. Free. Sysop: Doug Fick. [Exp. #112.]

The Midnight Mission BBS. (714)848-6808. 8-N-1, 24 hrs., 1200/2400/9600/14,400. Large game and GIF file areas. Full access w/call back verification. Sysop: Marty Strech. [Exp. #113.]

PC-Applications BBS. (714)432-9104, 557-8351, 557-6688. 24 hrs., 1200–14,400. Online games, email, echo-mail, over 250 conferences. Full access on first call with call back verifier. Sysop: Dave Robinson. [Exp. #113.]

Realty Network BBS. (714)969-9624. 8-N-1, 24 hrs., 1200/2400/ 9600/14,400. ANSI & RIP, realty info, chat, email, forums, games. Sysop: Doug Campbell. [Exp. #114.]

Sherlocktron. (714)492-0724. 8-N-1, 24 hrs., 2400. Sherlock Holmes BBS with lists of societies, publications, and purveyors. Sysop: Willis G. Frick. [Exp. #112.]

Software Exchange BBS. (714)552-3515. 8-N-1, 24 hrs., 1200/2400/ 9600/14,400. Over 30,000 files, over 4200 members. National echo mail, games, live chat. Free trial membership. Sysop: John Coon. [Exp. #114.]

Software Gallery BBS. (714)991-4019. 1200/2400/9600/14,400. Games, graphics, utils, adult, CD-ROMs. Free. Sysop: Joe Engebretson. [Exp. #113.]

Starbase Atlantis. (714)871-8810. 16,800. Chat, multinode games, and tradewars game. Echomail and files. Sysop: James Wihardja. [Exp. #114.]

805

Brain Storm BBS. (805)584-6088. 2400/9600/14,400. 8 lines, 10,000+ files, online games, chat, SIGs. [Exp. #112.]

Fantasy Sports BBS. (805)251-3902. 3:00 pm–9:00 am, 300/1200/2400. Sports related. Free. [Exp. #113.]

Real Estate Network. (805)298-2671. 2400. Free access to homes, agents, and software. [Exp. #113.]

818

African American BBS! (818)793-9155. P-Funk online. Sports, issues, health, business. Free. Sysop: Jeffery Mitchell. [Exp. #112.]

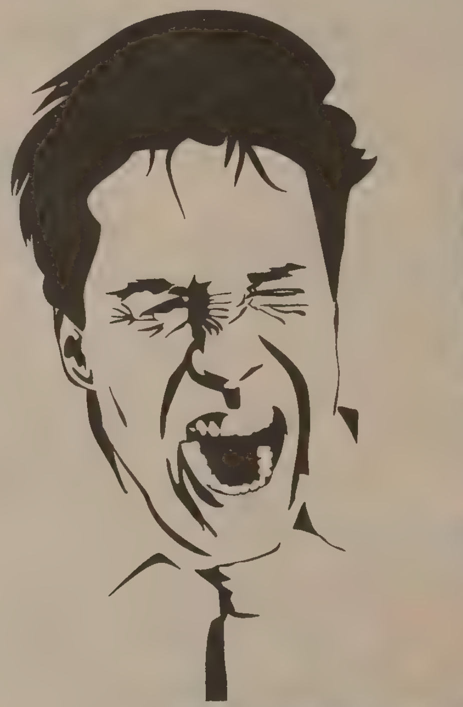
Alternate Lifestyles BBS. (818)457-6325. Adults only, for people who are into alternative lifestyles. Free two week trial. [Exp. #112.]

Asian American BBS. (818)284-4519. 1200/2400/9600/14,400. Focus on Pacific Rim business and issues. Carries *China News Digest.* Lrg. Asian-American user group. Free. [Exp. #113.]

Blasin' Bytes BBS. (818)776-2777. 1200/2400. 16 lines, 35 games, networks, three associate BBS's. Sysop: Barbara Mallut. [Exp. #112.]

Compu-Ad Information

Continued



RELAX.

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Network. (818)858-2763. 2400–19,200. Online real-time graphic listings of real estate, loan info, etc. Free. [Exp. #114.]

The Continuum BBS. (818)441-2625. Online games, conferences. Free. [Exp. #112.]

Chatterbox! BBS. (818)995-6959. 8-N-1, 24 hrs., 2400/9600/14,400. GIFs, ASP approved BBS, over 4GB library, multiline chat, games, and more. Sysop: Don. [Exp. #113.]

DAK Online Resource Center. (818)715-7153. Supporting all DAK mail order products. Sysop: Troy Noyes. [Exp. #114.]

Data Field BBS. (818)966-3305. 8-N-1, 24 hrs., 1200/2400/ 9600/14,400. OS/2, DOS, programming, graphics. Free. Sysop: David Levin. [Exp. #112.]

The Fortress BBS. (818)831-5072. 24 hrs., 14,400. The new BBS in the Valley, accepting members. Free. [Exp. #112.]

FreeLink BBS. (818)772-9934. 14,400. CD-ROM, UL/DL, messaging, multiline. Free, instant gratification. [Exp. #112.]

Infinite Wisdom North. (818)951-2796, 951-6097. 8-N-1, 24 hrs., 1200/2400/ 9600/14,400. Education, science, engineering, online games, offline mail. FidoNet 1:102/945. Free trial account. Sysop: Tom Honles. [Exp. #114.]

KBTC BBS. (818)967-0701. 24 hrs., 2400/9600. Business, education, games, and 7200+ files online. Free access on first call. Sysop: James Kalinowski. [Exp. #112.]

KeyHole BBS. (818)545-0870. 8-N-1, 300/1200/ 2400. Bring your Mac, UNIX, DOS questions or problems to us for a solution. Free. [Exp. #114.]

Laser Line BBS. (818)345-9122. 24 hrs., 2400. Amiga, Mac, IBM DTP, 1200 dpi laser printing online. [Exp. #113.]

LV-426. (818)752-8040. 14,400. Friendly people, files, msgs, doors, vi. No fees. [Exp. #114.]

Microlink PCUG BBS. (818)961-7903. 24 hrs. Free. [Exp. #112.]

Pro-Line BBS. (818)718-2450. Multiline, chat, matchmaking, lrg. file selection, email, database, and more. [Exp. #112.]

Software Bank. (818)993-5516. Mouse driven VGA RIPscrip Graphics. 8 lines, 6 CD's online, chat, multiline user interactive games. [Exp. #113.]

Southland Matchmaker. (818)793-9108. Pen-pal system, multilines, chat, game. Enter 'mm' at login prompt. [Exp. #113:]

The Treehouse BBS. (818)988-2115. Large file library, 4GB of adult GIFs, games, Windows programs, etc. Private and group chat. Free full access. [Exp. #112.]

Utilities Plus BBS. (818)842-3631. 2400. Utilities, IBM files, Adult GIFs. Member of United Sysops Association. [Exp. #112.]

Valley Apple CC BBS. (818)782-6471. 24 hrs., 300/1200/2400. Friendly to beginners. [Exp. #112.]

Valley Computer Club BBS. (818)999-0925. 8-N-1, 1200/2400. Sysop: Jeff Woolf. [Exp. #113.]

Wanna Byte??? BBS. (818)831-5072. 24 hrs., 1200/2400/9600/14,400. Over 600MB of P/D and S/W files and online games. Free. Sysop: Tony Rogers. [Exp. #114.]

Wizardry BBS. (818)222-4444. 1200/2400/ 9600/ 14,400. Online games, GIFs, text files. Free! [Exp. #114.]

909

CyberNETix. (909)734-1366. 14,400. Demos, clean GIFs, WAVs, MODs, MIDs, VNET email. Free. [Exp. #112.]

The Drop Zone! (909)245-3854, 245-9149. 24hrs., 1200/2400/9600/14,400/19,200. 2GB, echo mail, dl on first call. Adult by Sub only. Sysop: Rick Simmons. [Exp. #112.]

The Tavern. (909)591-9149 300/1200/2400/9600/14,40. Adult/clean, GIFs, NetWare, games. Free and subscription. Sysop: The Bartender. [Exp. #112.]

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BBS Spotlight continued...

other system users and share in the pomp of the chat experience. I was pleased to be greeted by other system users who happened to notice that I was online. Chatting here is an enjoyable pastime.

The file libraries are extensive and offer files for varying platforms of computer use. The IBM/compatible libraries offer files from a large number of shareware concerns and Mac file support is well established; somewhat a rarity in the popular subscription BBS services. Sysops boast a truckload of download files available with no download limit. You'll find that if your needs with BBS use include any significant amount of downloading, the faster modems can really improve your online experience.

You won't have to spend that 50¢ at the newsstand for *USA Today* if you're a member of CPI BBS. The day's top stories from all sections of the paper including complete business, sports, and weather information are available daily and are read online.

The Business and Information menu choice offers online magazines and some choices available from other menus, such as file libraries, classified advertising, and daily news. The magazines offer quite a range of computer-related information you'll find a pleasure to explore. Sysop Mark Bishop publishes The Virus Informer with the latest information for anti-virus protection. You'll find a complete listing of known viruses and the latest in virus-scanning software available for download.

The System User and Utility menu allows change of system parameters and information. This is where you'll go to make any changes in how your BBS usage is displayed, your password, or any registration information.

CPI BBS has a different appearance for young adults. The adult-only section has adult-oriented material for download as well as matchmaking among users. The young adults do not have access to these features. Sysops carefully screen system applicants to determine which section of the BBS is appropriate for access.

In the matchmaking area, you may search for other users with selected attributes or traits. You'll find that filling out a lengthy four-part questionnaire is prerequisite to using this feature. This will allow others on the system access to your profile as well.

The electronic mail networks provide users a good communication avenue for thousands of computer junkies from other areas of geography and experience. The electronic mail at CPI BBS is supported by FidoNet and will allow you to exchange mail with other system users as well as other FidoNet users nationwide.

The online games here are plentiful. These are not just the "run-of-the-mill" BBS games. The games here are interactive among users currently connected to the BBS and include The Wild Side (adult-oriented), Blackjack, Lexi, trivia, various word games, Yahtzee, Battleship for two online players, Roulette, Acey-Ducey, and Super Star Trek.

You'll find that your computing experience will be enhanced with this unique BBS. Getting online with CPI BBS is certainly a pleasure for your subscription BBS needs. Subscription rates range from $12 to $144 depending upon your membership terms. CPI BBS can be reached by calling (213)566-3004, (310)366-7472, or (818)281-5760. Give this BBS a try and tell 'em *MicroTimes* sent you. ■

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USER GROUPS

ACCOUNTING

ACCPAC & Open Systems Users Group. Meetings: 7:00 pm. Irvine. Speakers and Demos Call: (714)962-4760. [Exp. #115.]

AMIGA

Amiga User Group Of Long Beach. Meetings: 1st Thurs., 7:00 pm, 5373 E. Second St., Belmont Shores (in the Fire Station Bldg.). Call: Larry, (310)429-0752. [Exp. #117.]

ATUG—San Gabriel Valley. Meetings: 3rd Sat., 11:00 am, First S. Baptist Church, 4856 N. Golden W., Temple City. Call: Steve, (818)285-6424. [Exp. #115.]

South Orange Commodore Klub—SOCK. Meetings: 3rd Sat., 9:00 am, Computer Guild, Ste. 1003, 24001 Via Fabricante, Mission Viejo. New Location. Supports Commodore and Amiga, new users SIG. Call: Don, (714)830-2430. [Exp. #115.]

APPLE

Orange Apple Computer Club. Meetings: 1st Sat., 9:00 am, Orange Coast College, Chemistry Lab. Apple II supported, presentations, and disk of the month. Call: (714)770-1865. [Exp. #115.]

Original Apple Corps, Apple II User Group. Meetings: 2nd Sun. Support for beginners through experts. Write: PO Box 90065, Los Angeles, CA 90009. Call: Fred Duffy, (310)475-8400. BBS: (310)454-4660. [Exp. #112.]

ATARI

Atari Computer Association Of Orange County. Meetings: 2nd Sun., 12:30 pm. Fullerton Savings, 12860 Euclid, Garden Grove. Open to the public. Call: Tom Mynar, (714)960-6111, after 7:00 pm. [Exp. #116.]

ATESIG—Atari 8-Bit SIG. Meetings: 145 Surf Pl., Seal Beach. Cooperative group for Model Railroad applications. Call: (310)430-5433. [Exp. #116.]

South Bay Atari Computer Enthusiasts (SBACE). Meetings: 2nd Tues., 7:30 pm, Lomita VFW Hall, 1865 W. Lomita Blvd. Active in all user interests since 1981. Call: (310)375-4839 (10am–10pm). [Exp. #117.]

CLARISWORKS

ClarisWorks User Group. Supports both Macintosh and Windows. P.O. Box 701070, Plymouth, MI 48170. Call: (313)454-1969. [Exp. #117.]

COMMODORE

C128 West Commodore 128 User Group. Meetings: 3rd Wed., 18645 Arrow Highway, Rec. room. Free membership. Call: John, (818)331-1589; BBS, (714)598-1755 FidoNet. [Exp. #112.]

South Bay Commodore Users Group. Meetings: 3rd Thurs., 7:00 pm, SEC Redondo Generating Station, 1100 Harbor Dr. (across from King Yacht Harbor). Support for 64/128 computers. Open to all users of Commodore Computer equipment and those who would like to receive or exchange information on programs, applications, or hardware. Call: (310)324-8357. [Exp. #112.]

Southern California Commodore User Group. Meetings: 3rd Wed., 7:00 pm, Church of the Nazarine Christian School, Rm. 18, 15000 Studebaker Ave., Norwalk. Supports C64 & 128 models. Call: Bill Davies, (310)599-1913. [Exp. #112.]

CORELDRAW

Association Of Corel Artists And Designers, Long Beach/Orange County Chapter. Meetings: 1st Tues., Farmers and Merchants Bank, 12535 Seal Beach Blvd., Rossmoor. National organization that provides support for CorelDraw and its associated programs. Call: Ken Wong, (310)835-6000 or (714)821-5378. [Exp. #112.]

Santa Monica Corel Users. Meetings: 2nd Mon., 7:00 pm, Guest Quarters Suite Hotel, 1707 4th St., Santa Monica. Call: John Youngman, (310)399-3437. [Exp. #113.]

DESKTOP PUBLISHING

Aldus/DTP Users Group. Share ideas and gain knowledge about the standard page layout and graphic design programs on the market. Call: Dave Casad, (310)370-6269. [Exp. #115.]

Southern California Ventura Publisher User Group (SC–VPUG). Meetings: Last Tues., 7:00 pm, 401 N. Brand, Glendale, Glendale Federal Bank Building. Product demos, Q&As, library resources. Call: (818)955-5830. [Exp. #115.]

EPSON

Epson UG/Orange County. Meetings: 3rd Sat, 10:00 am, 2151 Michelson near JW Airport, Irvine. QX, PX, CP/M, VALDOCS—support, tech, periodical & disk library, and parts. Call: (714)893-3305 [Exp. #115.]

IBM & COMPATIBLES

Coast IBM PC User Group. Meetings: Last Sat., 9:00 am, Science Hall, Orange Coast College, Costa Mesa. Speakers, BBS, software library, newsletter, and SIGs. Everyone welcome. Call: (714)843-2048. [Exp. #112.]

Greater South Bay PC User Group. Meetings: 2nd Thurs., 7:30 pm, Christ King Lutheran, 2706 W. 182nd St., Torrance. Visitors welcome. Call: (310)329-2804. [Exp. #115.]

Long Beach IBM PC And Compatibles User Group. Meetings: 3rd Wed, 7:00 pm, Masonic Temple, 1220 E. Market St., Long Beach. Novice and experienced welcome. $25/yr, $35 for a family. Call: Jim Wells, (310)439-7114. [Exp. #117.]

Los Angeles Computer Society. Meetings: 2nd Tues., 7:00 pm, Culver City High School. Live presentations and giveaways. Meetings are free. Call: (310)471-2726. [Exp. #116.]

Microlink PCUG. Meetings: 1st Sat., 6:00 pm, La Habra Sr. Center, 165 E. La Habra Blvd., La Habra. Beginners and experts welcome. Free SIG classes. N. Orange Co./San Grabiel Valley. Call: (818)961-6214. [Exp. #115.]

Orange County IBM PC Users Group. Meetings: 2nd Tuesday, 6:30 pm. Computer Learning Center, 1240 S. State College Blvd., Anaheim. Speakers, software, newsletter. Open to public, all welcome. Call: (714)990-0580 [Exp. #115.]

Pasadena IBM User Group. Meetings: 3rd Wed., 7:00 pm, 2184 N. Lake Ave., Altadena. Speakers on hardware/software, SIGs, library, newsletter, and BBS. Call: Steve Bass, (818)791-1300. [Exp. #113.]

San Gabriel Valley/Inland Empire User Group (CHOMP). Meetings: 4th Thurs., 7:30 pm, Harvey Mudd College. Call: Eric Haakenson, (818)308-6025. [Exp. #113.]

Southwest PC User Group. Meetings: 3rd Sat., call for location, or write: PO Box 78785, Los Angeles, CA 90016. Call: Christine Tripp, (213)935-4105. [Exp. #117.]

Thousand Oaks Personal Computer Club (TOPCC). Meetings: 4th Thurs., 6:30 pm, Goebel Senior Adult Center, 1385 E. Janss Rd., Thousand Oaks. Call: (805)495-8325. [Exp. #117.]

TUG-NET. Meetings: 1st three Thurs., 7:00 pm, Tektronix Corp., 21300 Erwin St., Woodland Hills. Enter through back door of building, press buzzer. Call: (818)249-1629. [Exp. #117.]

Valley Computer Club. Meetings: 1st Wed., 7:00 pm, Burbank Board of Realtors Bldg., 2006 W. Magnolia, Burbank. BBS, PD library, SIGs, newsletter. All welcome. Call: Wes Arnold, (213)221-4433; or Grayce Hruda, (818)842-3707. [Exp. #117.]

KAYPRO

KAYOS Kaypro User Group. Meetings: 4th Mon. of even months, 6:00 pm, El Segundo Library. Call: (310)379-8339. [Exp. #115.]

MACINTOSH

Los Angeles Macintosh Group (LAMG). Meetings: 3rd Thurs., 7:30 pm, Dept. of Water & Power, 111 N. Hope St. So. Cal's largest all-Mac user group meetings, monthly magazine, classes, PD software, and more. Call: (310)278-LAMG. [Exp. #112.]

Orange Apple Computer Club, Macintosh User Group. Meetings: 1st Sat., 1:00 Pm, Chemistry Lab, Orange Coast College. Presentations and club disks. Call: (714)770-1865 [Exp. #115.]

Original Apple Corps, Macintosh User Group. Meetings: 2nd Sun. Support for beginners through experts. Write: PO Box

continued on page 153

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Calendar Of Events continued

continued from page 106

September 12 Computer Show. Sequoia Conference Center, Buena Park. Computer Marketplace. Call: 1-800-800-5600.

September 18 Computer Show & Sale. Anaheim Stadium, indoors. Richard James Corp. Call: 1-800-685-1400.

September 19 Computer Show & Sale. Antelope Valley Fairgrounds, Lancaster. MarketPro Shows. Call: (415)388-8893.

September 19 Computer Show & Sale. Orange County Fairgrounds, Costa Mesa. Richard James Corp. Call: 1-800-685-1400.

September 20–23 USENIX Symposia: 2nd Microkernels And Other Kernel Architectures. San Diego. USENIX Association. Call: (714)588-8649.

September 25 Computer Show & Sale. Riverside Convention Center. MarketPro Shows. Call: (415)388-8893.

September 26 ACP Computer Swap Meet. Santa Ana. ACP. Call: (714)558-8813.

September 26 Computer Show & Sale. Civic Auditorium, Oxnard. MarketPro Shows. Call: (415)388-8893.

September 28–29 Electronic Books Conference. New York. Mekler. Call: 1-800-632-5537.

OCTOBER

October 2 Computer Show. Sherman Entertainment Center, Reseda. Computer Marketplace. Call: 1-800-800-5600.

October 2–17 Electronics Computer Shows—Far East Tour. Commerce Tours International. Call: (415)433-3072.

October 3 Computer Show. Sequoia Conference Center, Buena Park. Computer Marketplace. Call: 1-800-800-5600.

October 9–10 Computer Show With Computer Training Seminar. LA Fairgrounds, Pomona. Computer Marketplace. Call: 1-800-800-5600.

October 9–10 Computer Swap Meet & Sale. Long Beach. Megabyte Computer Shows. Call: 1-800-745-0266.

October 17–20. OS/2 Professional Interchange Conference. Palm Springs. OS/2 Professional. Call: 1-800-GET-OS20.

October 19–21 Media Summit '93. New York City. REC. Call: Customer Relations, (203)352-8302.

October 20–23 Seybold San Francisco Conference And Exposition: The Evolving Process Of Communication. San Francisco. Seybold Seminars. Call: 1-800-433-5200, ext. 1010.

October 26–28 Common Desktop Environment Developers Conference. San Jose. UniForm Association. Call: 1-800-225-4698.

October 30–31 Computer Show With Computer Training Seminar. LA Fairgrounds, Pomona. Computer Marketplace. Call: 1-800-800-5600.

CLASSES, SEMINARS, AND WORKSHOPS

AUGUST

August 7 Microsoft Excel 4.0 Class. Monrovia. The Organizers. Call: (818)303-3311.

August 8 Lotus 1-2-3 Rel. 2.3 Macros Class. Monrovia. The Organizers. Call: (818)303-3311.

August 12–16 Intro To Adobe Photoshop Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

August 15 Newsletters On The Mac Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

August 15 Word For Windows 2.0 Class. Monrovia. The Organizers. Call: (818)303-3311.

August 15 WordPerfect For Windows Class. S. Pasadena. Classes Unlimited. Call: (818)441-5977.

August 16–18 Software Safety: Principles And Practice Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

August 19–20 Adobe Photoshop 2.5 Workshop: Professional Color, Masking & Effects. Costa Mesa. Graphic Communications Assoc. Call: (703)519-8160.

August 20–September 3 Intro To Mac Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

August 21 Novell System Manager Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 21 PageMaker On Mac Class. S. Pasadena. Classes Unlimited. Call: (818)441-5977.

August 22 Photo Retouching With Photoshop Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

August 23 C Programming & C++ Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 23–26 Applying Quality Management Principles To Software Development Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

August 24 AutoCAD Release 12 Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 24–25 Novell NetWare Seminar: An Intro To Networking PCs With Novell. Newport Beach. Center for Advanced Professional Development. Call: (714)261-0240.

August 25 Windows 3.1 Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 27 WordPerfect 6.0 Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 28 dBASE IV Class. Laguna Hills. Computer Education Institute. Call: (714)472-4192.

August 29 Special Effects In Photoshop Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

SEPTEMBER

September 1 How To Use Modems And Bulletin Boards For Fun And Profit Demonstration. Burbank. Valley Computer Club. Call: Grayce Hruda, (818)842-3703.

September 8 High-Speed Windows Applications Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 8–10 User-Oriented Interface Design: Process And Product Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 9–13 Intro To Aldus Freehand Course. Los Angeles. Dept. of the Arts, UCLA Extension. Call: (310)206-1422.

September 10 Intro To Lotus 1-2-3 Class. S. Pasadena. Classes Unlimited. Call: (818)441-5977.

September 14–17 Object-Oriented, Distributed, And Intelligent Database Systems Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 17 Info Tech Workshop: Graphics, Text, Voice, And Motion. Monrovia. LA Chapter of ASIS. Call: (818)356-6704.

September 20–23 An Intro To C++ Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 22–24 User-Interface Design For Interactive Multimedia Systems Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 28–29 System Administration Of NetWare Seminar. Newport Beach. Center for Advanced Professional Development. Call: (714)261-0240.

September 28–30 Software Metrics Short Course. Los Angeles. UCLA Extension. Call: (310)825-1047.

September 30–October 1 Installing, Troubleshooting & Maintaining NetWare Seminar. Newport Beach. Center for Advanced Professional Development. Call: (714)261-0240.

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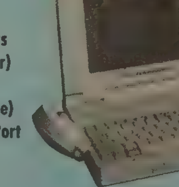

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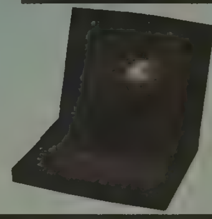

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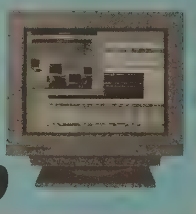

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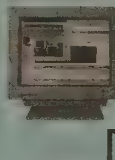

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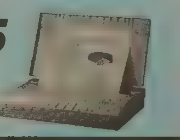

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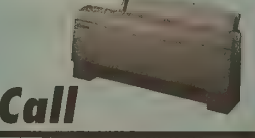

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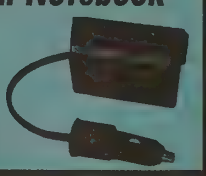

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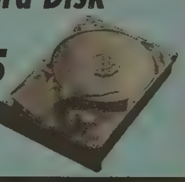

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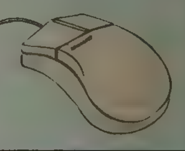

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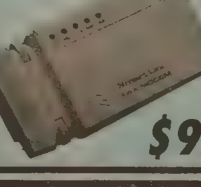

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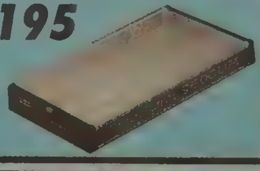

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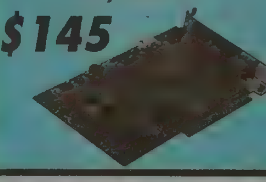

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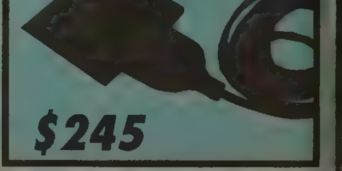

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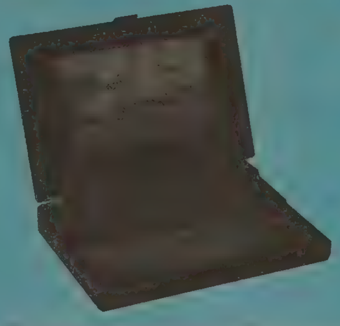

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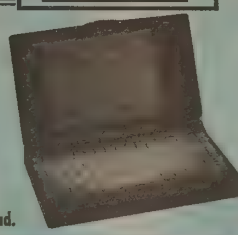

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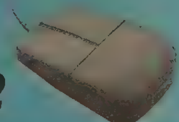

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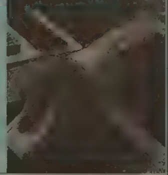

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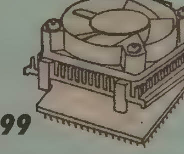

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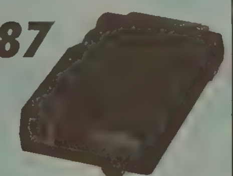

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D'Cückoo: Multimedia & Interactivity In Pop Music

BY JONATHAN E.

Pop music has long been an incubator for traditional expressions of multimedia—the light shows and posters of the Fillmore era, melding music with visual art forms; The Who's "Tommy," a successful rock opera on Broadway twenty-five years after its original incarnation. The Residents and Gwar are latter-day examples of the long evolution of theatrical rock. Digital technology offers the possibility of dramatically expanding upon these historic efforts to produce a new and more integrated generation of music-inspired multimedia—especially in the live-performance arena.

A limited degree of interactivity has been inherent in music performance over the years. Musicians interact at one level as they play rehearsed and composed pieces; when jamming, they move to a different level. Between-song banter is a form of interaction with the audience, and performers and audience often create a feedback loop that can either elevate or depress performance levels.

Aside from clapping in time, though, the audience's input into musical performance barely dents the barrier between performers and audience. Once again, digital technology stands to revolutionize the current status quo, making musical performance into something more like a group collabo-

Copyright © 1993 by Jonathan E. All rights reserved. Jonathan E. has worked with desktop multimedia since 1988. He also writes about world music and the Archaic Revival for BAM. *His USPS mailing address is c/o SoundSwell, 54 29th St., Richmond, CA 94804. His email address is jeve@well.sf.ca.us*

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> Tina "Bean" Blaine of D'Cückoo: "We're greatly influenced by going to places like Africa where everyone is a musician, whether they're playing an instrument or not. Everyone is a part of whatever the festival or celebration is, and that kind of spirit is what we're trying to create in our shows."

The emergence of better tools for multimedia and interactivity raises many questions: the nature of creating art, the relationship of one medium to another, the techniques of collaboration and improvisation, the amount of control required to maintain artistic focus, the marketing of recorded results to a wider audience. Like the last century's wagon-train travelers, pioneers in this field are discovering that the journey requires substantial amounts of vision, tool-making and repairing, as well as detours, backtracking, and an eye for the weather.

Thankfully, in contrast to the Old West, this is virgin territory; attacks from the indigenous residents need not be feared. On the other hand, the entertainment industry has a certain infrastructure, which displays some passive resistance or inertia to the changes needed to realize these visions of the future.

D'CÜCKOO AND SOUND

D'Cückoo is a Bay Area band whose goal, says founding member Tina "Bean" Blaine, is "to involve people in what's happening. We're greatly influenced by going to places like Africa where everyone is a musician, whether they're playing an instrument or not. Everyone is a part of whatever the festival or celebration is, and that kind of spirit is what we're trying to create in our shows."

On stage, D'Cückoo consists of five female musicians: two founding members, Blaine and Candice Pacheco; plus keyboardist, bassist, and electronics wizard Jennifer Hruska; percussionist Debbie Lane; and vocalist Tracy Blackman. Pacheco plays synth guitar and keyboards, and teams up with Blaine and the other band members on D'Cückoo's genuinely original and self-built turtle drums (looking a little like kettle drums) and marimbas. Unlike their acoustic, analog cousins, these instruments are electronic, used to trigger MIDI signals and samples.

Blaine remembers that when she returned to the States in the '80s, after studying music and dance while traveling in Africa and Asia, she was suffering from "massive culture shock" when she saw Mapenzi, a marimba-based world beat band in San Francisco. "Lights went off in my head. It was 'I want to learn how to play this instrument.' I hadn't played marimbas before; I was a percussionist and a keyboardist. For me, marimbas were the perfect synthesis of bringing together a melodic instrument with percussion. I knew Candice from dance classes and Patti Clemens, the other founding member, so we all got together and built seven marimbas. We thought it would be cool to build instruments that could sound like those, but could also sound like anything at all."

Pacheco adds, "There were no blueprints. None of us had a hardware background. Bean had a little bit of engineering experience from college. I did software and I studied electronic music. Basically when I was in school I studied ethnic music, or global music, and electronic music, so that's sort of been my synthesis for a long time. We just embarked on this odyssey of figuring out how to do that."

The original hand-wrapped boards still hang on their studio wall, and Blaine laughs that, "Any real engineer would run screaming from the room if they looked at our wire-wrapping job—but they work."

The band makes all its own samples except for a very few taken from the Poke in the Ear library. In performance, they use no desktop or PC level technology. For recording, they use a Mac IIci with OSC's DECK program, which records direct to hard disk with multitracking abilities.

Musically, D'Cückoo are extremely varied, at times sounding funky, spacey, orchestrally rocky, or purely percussively propulsive. Influences range from the Shona music of Zimbabwe and the taiko drumming of Japan to the harmonic throat music of the Tuvans and Middle Eastern vocals.

Visually, the band is striking, especially when all five players are lined up on the marimbas or turtle drums, arms flying in unison with fluorescent sticks pounding out the beat. Blaine points out, "We love the really big physical playing style and the fast interlocking rhythmic parts that are what that [Shona marimba] music is about. However, there's a lot of harmonic stuff going on too. People think of marim-

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bas as percussion instruments—I guess they are—but most of what we're playing on them is melodic and harmonic parts." Pacheco adds, "We also texturally layer different sounds so that you're not hearing a strict marimba sound. There's a lot of other things that are happening timbrally to create layers and effects that we like to do, so there's transitions in the music and things build and gather more excitement."

D'CÜCKOO AND VISUAL MULTIMEDIA

While the music is primary, D'Cückoo place great emphasis on the visual multimedia aspects of their performances. Again, their goal is to increase the involvement of others, both the audience and their visual collaborators, in the experience of the performance.

D'Cückoo's three main visual collaborators are Maggie Hoppe, who runs videotapes, operates the video switcher, and provides general graphic design; Ron Fischer, who produces the SGI Indigo computer graphics; and Phyllis Laurie, who projects slides. However, as Fischer points out, they're only the tip of the iceberg because they use the work of about thirty other video and film producers and computer graphics programmers.

> While songs, videotapes, and Indigo programs have been matched up by a process of experimentation to discover combinations that work, in performance each show is different. Maggie Hoppe, who runs the videotapes, explains, "Like jamming, it's not carefully choreographed."

Besides the slides, the visuals come from two sources: videotapes and the Indigos. Basically, the Indigos are running 3-D modelling demos. These are individual programs of between five thousand and forty thousand lines of code each, written by programmers including Angus Henderson, David Maynard, Chris Perry, Gavin Bell, Dave Tristram, and Fischer himself. In most cases, Fischer has modified the programs to maximize his control.

Different programs are used for different songs. Using a QWERTY keyboard, a mouse, and a SpaceBall from Spatial Systems, Fischer controls various parameters such as color, the number and speed of objects, and the viewing angle, all in real time. These programs are fun—but not easy—to play with. Different programs use different combinations of keystrokes and he notes that with "some programs I'm more like a conductor in a symphony, and with some I'm more like a performer." Some effects in a few programs can be triggered by MIDI signals, or by the amplitude or frequency of the sounds; this is an area of interactivity that is still being explored but offers much for the future.

The videotapes come from several artists and were produced with various techniques. Mark Winkler's "Clown Head," used while the MIDIBall is in action, is the only one produced entirely on a Mac; it was done in Swivel 3D. Susan Scott's "Falderal," featuring bouncy baby dolls, was done with stop-frame animation, while Hoppe's "Big Boys" uses real footage taken from satellite feeds during the Gulf War with 2-D animation and a lot of post-production. "Big Boys" was the only video made specifically for D'Cückoo. Other videos are basically ambient and abstract.

Phyllis Laurie works fairly closely with the band to coordinate her slide images with the band's song material and is considered as important a contributor as Fischer and Hoppe; her effect is more subtle because the images are static. She usually runs two or three slide projectors at a time to blend images.

While songs, videotapes, and Indigo programs have been matched up by a process of experimentation to discover combinations that work, in performance each show is different. Hoppe explains, "like jamming or composition to music, it's not carefully choreographed." Actual rehearsal time between the visuals and the music is extremely limited, mostly occurring at soundchecks, although Fischer practices his parameter control using tapes of previous performances. He loads the appropriate program at the beginning of each song, while Hoppe has each video precued on its own tape and inserts it into the tape deck to begin playback. As the band plays, Fischer coordinates the parameters of the program and Hoppe, at the switcher, spontaneously mixes the tape with his program output. Depending on the setup of the particular venue, she may be able to see what he has on screen or they may communicate through headsets. Every so often, one member of the team may spring a complete surprise on the others, such as when Hoppe ran Susan Scott's "Falderal" during the song "Love Again" for the first time without any consultation. Now it's the regular video for the song.

Different shows may have different multimedia elements, depending on the budget available and the size of the venue. However, the basic preferred configuration consists of two Silicon Graphics Iris Indigo computers, each with a high-speed R4000 RISC processor, a standard CD-quality audio input, the Elan graphics board of four parallel graphics processors, which perform rendering operations in parallel with the main CPU, and the Galileo video board; two computer monitors; a preview monitor; a program monitor; generally a VHS deck ("sometimes we've had the pleasure of having an SP beta deck" says Hoppe); a video switcher, which mixes tapes with computer graphics and mattes out areas and fills them from other sources; video and slide projectors; and screens. Sometimes the slides and video are projected onto the same screen, but usually the slides are independently operated. Obviously, this equipment is far beyond regular desktop standards.

When asked about the variation from one show to another, Fischer replies, "There's enough consistency that the show has an identity—there's the same sorts of imagery used in each show. The only problem that we have is that sometimes the budget goes through the floor and we wind up with a really low-end video projection system." Hoppe finds that with the different models of switcher available, and no ability to rent the same one for every show, she's "got to sit down and correlate in my brain from one piece of equipment to another, because a set of buttons might be named something different from a JVC to a Grass Valley."

D'CÜCKOO AND INTERACTIVITY

While all this represents a fair degree of interactivity between musicians, audi-

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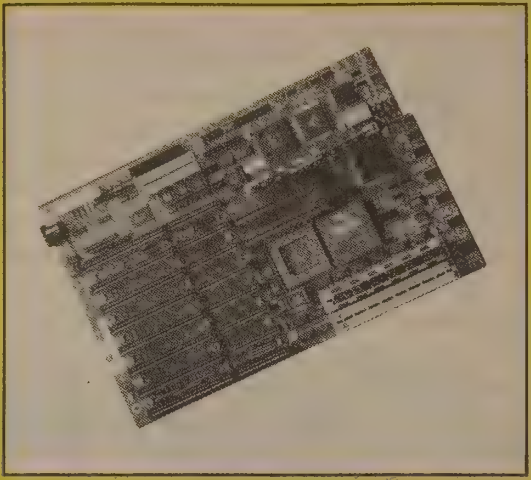

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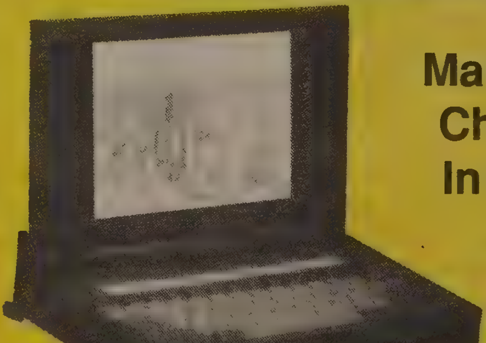

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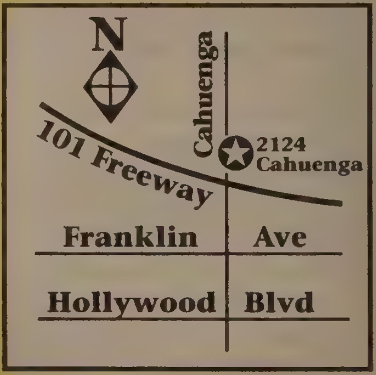

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ence, and visual artists, two other elements of D'Cückoo's multimedia performance take it much further.

One is RiGBy (Red-Green-Blue), a digital face puppet, who appears on-screen between songs to banter with band members and entertain the audience, while samples are loaded and, as Pacheco puts it, "things are fixed." RiGBy is a brilliant and very effective innovation for smoothing out the downtime and creating a sense of involvement. Hoppe designed RiGBy's features and Fischer wrote the code to control her using SGI's Inventor 3D Toolkit.

RiGBy's eyeballs, eyebrows, eyelids, and mouth (ranging from smiles to frowns), as well as the tilt and position of the face are controlled by Fischer in real time using the SpaceBall. Her lips are controlled by direct audio input from the voice of the off-stage "Virtriloquist," played by the cyberactive Linda Jacobson. RiGBy's character is impressively developed and the spontaneous interaction between her and Blaine, in particular, is very amusing. Future plans include a variety of facial features that the audience will vote on to change her appearance.

D'Cückoo's second major interactive coup is the M DIBall—a plastic ball, about 4ft. in diameter and led with helium, that is bounced around in the air by he audience; each "hit" triggers a MIDI signal through a wireless connection. Once the audience understands what's happening—it is now an expected part of the show—the enthusiasm becomes palpable.

Pacheco came up with the idea after a discussion with George Coates about how much interactivity audiences really wanted. The MIDI signals can also be used to trigger some graphics events on-screen, but as Fischer notes, "When the Ball's out there, the audience is totally focused on it." The MIDIBall is something that can only work in certain venues—low ceilings and lots of lights do not make for a comfortable experience with an overly enthusiastic audience. However, as a device to involve the audience, it is unparalleled.

D'Cückoo constantly work on new ways to improve audience involvement. The main challenges they face are the common ones of lack of time and lack of money. However, they are not afraid to take chances and fix mistakes; Fischer laughingly suggests that people do indeed file bug reports on the shows.

Not surprisingly, D'Cückoo have set up a way to do that. There's a D'Cückoo topic on The WELL, Topic 266 in the Bay Area Tonight conference, and you can send email to *dcuckoo@well.sf.ca.us.*

To experience the D'Cückoo interactive multimedia experience for yourself, attend their next show at the Great American Music Hall in San Francisco on Friday, July 30 at 9pm. Later this year, their second audio CD will be released by RGB Records, a new label set up by some other pioneers, Hearts of Space. In the meantime, you may obtain their first self-released CD for $15 postpaid from 6114 La Salle Ave., Ste. 414, Oakland, 94611. ■

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HyperStudio:

Multimedia For The Masses

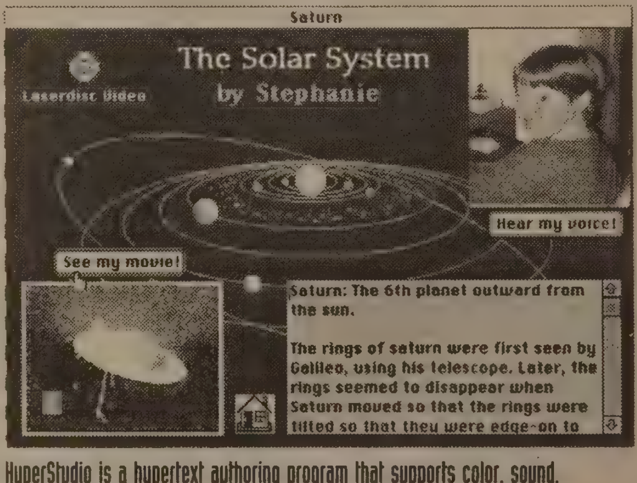
BY TONY REVEAUX

Easy Enough For Kids—And Executives

Each month, the threshold of accessibility for multimedia authoring, reading, and communicating drifts lower and lower. The learning curve, though, is still prohibitive for most people. Color, sound, animation, photos and video—and absolute interactivity—should be as accessible to us as word processing is with MacWrite and WriteNow, and graphics with MacPaint and DeskPaint.

Brøderbund's KidPix and Davidson's KidWorks, though targeted at the K-6 range, come the closest to being models of direct, instinctive multimedia authoring. KidPix expands the variety and functionality of graphic tools to the automation of dynamic, and even chance-driven, special effects with sounds. With KidPix Companion, authoring and editing with QuickTime documents is simple and clear. Davidson's KidWorks has many of these attributes, as well as word processing, and can also convert text to voice.

But as genuinely delightful and absorbing as these programs are, the thick, sticky "kidness" of them can begin to work against the adult who just wants to punch



Saturn: The 6th planet outward from the sun.

The rings of saturn were first seen by Galileo, using his telescope. Later, the rings seemed to disappear when Saturn moved so that the rings were tilted so that theu were edge-on to

HyperStudio is a hypertext authoring program that supports color, sound, voice recording and playback, animation, laserdisk control, and QuickTime

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Tony Reveaux, a San Francisco-based consultant, is the editor of Computer Publicity News *and the author of* "Cool Mac Clip Art Plus!" *from Hayden Books. He can be reached via Usenet (luna@well.sf.ca.us) or MCIMail 290-3008.*

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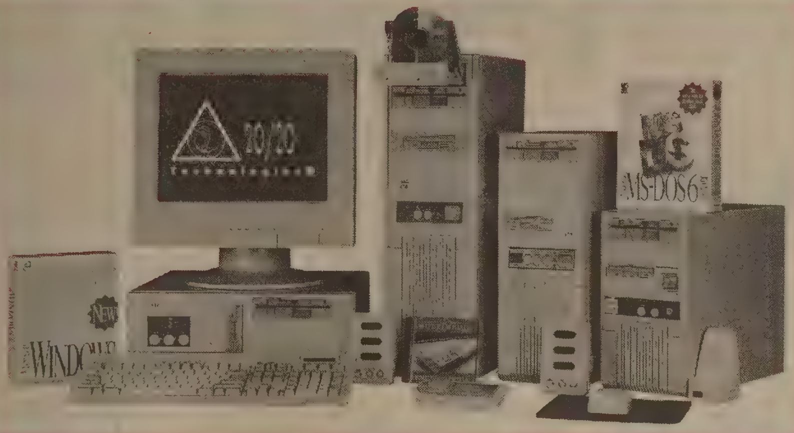

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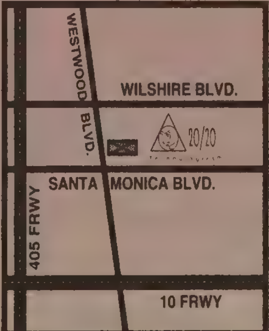

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out some quick "media processing." Now, with the Macintosh version of Roger Wagner's HyperStudio ($179), we have the best thing so far for direct, "Point-A-to-Point-B" communication—the Volkswagen of multimedia authoring.

I came across HyperStudio while at the thirty-sixth San Francisco International Film Festival in April, where one of the highlights was the screening of *The Last Bolshevik* by French auteur filmmaker Chris Marker (*La Jete, La Jolie Mai*). Marker, who's been using HyperStudio with great enjoyment, drew my attention to the program. In a demonstration on an Apple IIGS, I saw a presentation of multimedia documents created by grade-school students and teachers. Lively, inventive and active, they were full-color multimedia with sound, music, voice, animation, digitized photos, QuickTime movies, and transition effects.

Wagner has been a tireless promoter of his company and of enlightened education, well known for his lurid ties as well as his generous enthusiasm. HyperStudio, first developed on the now-discontinued Apple IIGS platform, has become entrenched in the K-12 in six years. When I asked Wagner if he planned to promote the new Macintosh version to a wider audience, he replied that he was comfortable and successful within the school market; he feels that theirs is too small a company to invest in huge promotional blitzes. So here is something really neat you might not hear about elsewhere.

MULTIMEDIA: SQUARE ONE

Jeff Peach, a sixth grade teacher at Magnolia Intermediate School in Grass Valley, leads one of the thousands of classrooms that use HyperStudio. His class produces interactive HyperStudio presentation documents with standard, consumer-electronics-level VHS camcorders, the $350 Apple II Video Overlay Card in a IIGS, and about $3,000 worth of Panasonic editing equipment.

"Not fancy stuff," he says, "but it does allow you to do a pretty good job in cutting and pasting video. We're producing a video for Roger Wagner, called HyperStudio Made Easy. Roger wanted a twenty- to thirty-minute video; I've used HyperStudio in my classroom for a long time, so we assembled all the pieces and put together a whole piece to show how HyperStudio comes together. It's a slick little production. I even got one of the parents to do the music.

"I've used Apple's HyperCard," continues Peach, "but there's no comparison at all as far as I'm concerned. HyperCard is a wonderful program. It can probably do fancier things than HyperStudio can do, like HyperTalk and some unique scripting, but as far as ease-of-use in classroom applications, I think HyperStudio has it beat hands down. It can use HyperLogo, but I haven't needed to go to that so far. I've talked to other teachers that were HyperCard people, and said, 'Check this program out, especially now that it's on the Mac;' they work with it for fifteen minutes and they're sold. It's so easy to use and to teach, and it's in color. Kids get excited about color. This color-Nintendo-graphics-animation generation—it's their world."

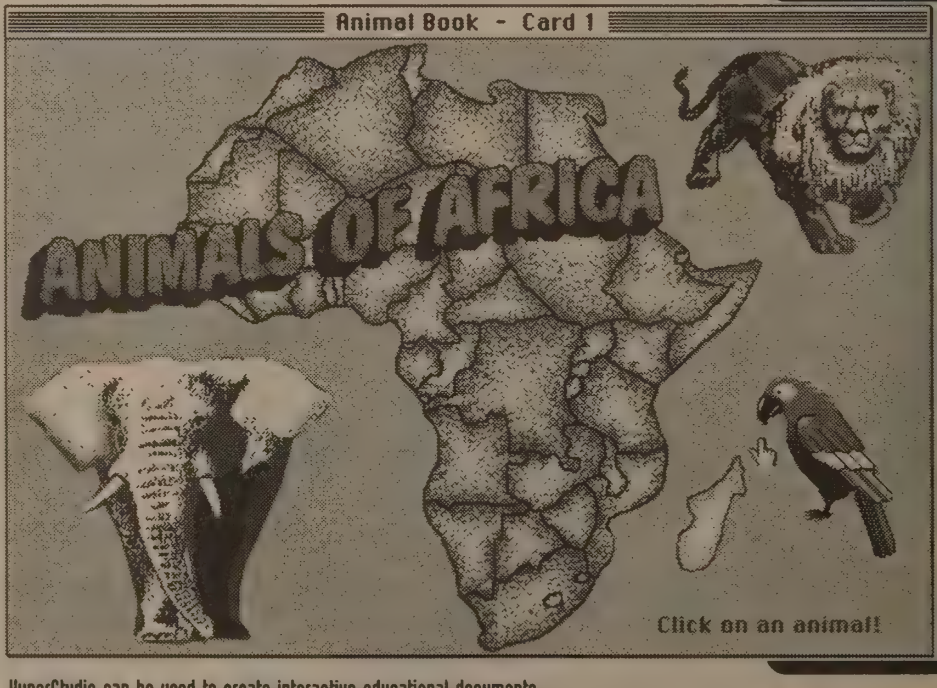
HYPERLOGO

Wagner's HyperStudio includes support for HyperLogo script command sequences, much as HyperTalk extends the capabilities of Apple's HyperCard.

HyperLogo is a later version of the venerable Logo, a high-level "easy to learn" programming language written for children in the 1970s by Seymour Papert of Massachusetts Institute of Technology, combining graphics with straightforward English-like instructions. HyperLogo incorporates TurtleGraphics, a tightly written and versatile graphics primitive extension of Logo. HyperLogo includes mathematics functions, basic and/or logic, and the TOOT sound commands that can be given MIDI-specific attributes.

Teachers, educators and learning technicians here and in Europe have nurtured Logo for years, drawn to it for its accessible and reliable performance. Compared to some other languages used for educational applications, Logo presents a Tinkertoy- or Lego-like paradigm of connective clarity.

Its easy auditing and reporting make it a natural for testing and scoring structures. HyperStudio has a simple test-and-score stack template that can show correct and incorrect answers and accumulate test



HyperStudio can be used to create interactive educational documents by the very schoolchildren that they are meant to serve.

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results. All this can be created in multimedia with sounds and animations for reinforcement and variety. HyperStudio includes an informational stack on HyperLogo and a text document which is a manual for using the language.

HYPERSTUDIO PRACTICE

But HyperStudio is so basically complete without ever sampling HyperLogo that you can just go in and plug 'n play. HyperStudio shares with HyperCard and SuperCard the card-and-stack metaphor; cards and stacks can be built with hypertext links activated by visible and invisible buttons or with timers. Building a stack is swift and easy, and provides instant sampling at every level. What helps is its interface automation, where the next step, whether it is positioning a button, choosing a sound or activating another element, is brought up right before you. The interface leads the way throughout the process.

Creating animation sequences is easy, with HyperStudio's simple replacement, or "flipbook," method. The draw and paint functions are adequate, except for the absence of rotation. HyperStudio can work with 16 or 256 colors, but you can import graphics, including 24-bit documents that have been reduced to 8 or 16-bit. (A special black-and-white version of the program is available by request.) There is a fully functional Pioneer LaserDisc control interface for a remote device.

QuickTime movies are imported as easily as a sound or a clip art graphic. In tune with the Performa Generation of Macs, you can record voice and sound directly into the program. Like HyperCard's Buttons, New Button Actions (NBAs) are special programs that extend the functionality of stacks, and are written from various sources. Two that are included in the package are Roll Credits, which scrolls text like a movie's credits, and Animator, which supports path-based animation.

Is the new HyperStudio now thoroughly modern Mac? QuickTime is a good test. The QuickTime MooV of NASA's Saturn flyby, included in one of the package's school demonstration files, worked fine. But how easy was it to acquire QuickTime documents? To put it to the test, I mounted BMUG's "TVROM" CD- ROM in an external drive. Since I had just come from the sneak preview of *Jurassic Park* hosted by SuperMac, naturally the MooV I chose from the "TVROM" was "Gecko Eats Cricket." Nothing could be easier—I could position its window and the button anywhere on the card, and then punch 'n play. It was just as easy to add the sound effect of an elephant's trumpeting roar to make the scene truly complete.

I've always been comfortable with HyperCard, but HyperStudio is incredibly fast and easy, and supports full color. HyperStudio is rougher and doesn't have the bells, whistles or pull-chains, but for multimedia to be ultimately viable, it has to be able to be this easy. ■

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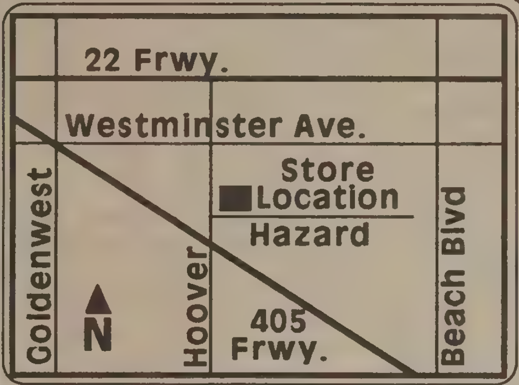

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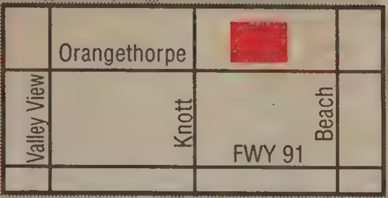

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Retina:

High-Resolution 24-Bit Display For The Commodore Amiga

BY DOUGLAS J. NAKAKIHARA

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The Amiga has always enjoyed lightning-fast graphics that would be difficult, if not impossible, to achieve on other PC platforms. This performance is a result of the Amiga's custom chip set.

However, because of this design, it is difficult to upgrade the video display, unlike the PC world where you pop the "display card of the week" into your computer and off you go. Many people may be surprised that even the newest model Amiga does not have a native 24-bit display. Its HAM8 mode is capable of 262,000 colors, but this is a far cry from sixteen million.

Fortunately, third-party developers offer many add-on 24-bit display cards. Historically, the problem with these has been that you could not view Amiga applications on them unless the application was specifically written to support the display card. As a result, two monitors were generally required.

THE RETINA SOLUTION

Finally, there's a single-monitor solution: The Retina display card from Macro System. The Retina can emulate all native Amiga displays, including the new AGA modes.

The maximum resolution for a 24-bit display is 1152 x 862; for a 16-bit display it is 1280 x 1024, while a 8-bit display can go up to 2400 x 1200. The maximum resolution is also dependent on your monitor's capabilities. Horizontal frequencies from 15 to 75KHz and vertical frequencies of 50–95Hz are supported, so it is compatible with most multi-scan and VGA monitors, including the Commodore 1950 and 1960. Display modes can be interlaced or non-interlaced, so no de-interlacing device is necessary. Amiga owners now have access to the myriad of available monitors and no longer have to worry if their display of choice supports the standard Amiga 15.75-31.5KHz horizontal frequency rate, which many do not.

The Retina has its own on-board RAM in

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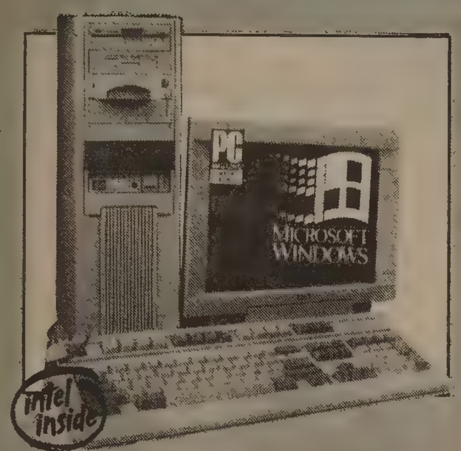

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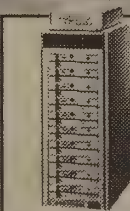

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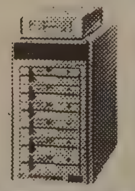

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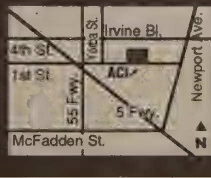

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either a 2MB or 4MB configuration. Four megabytes will allow you to display double-buffered flicker-free animations.

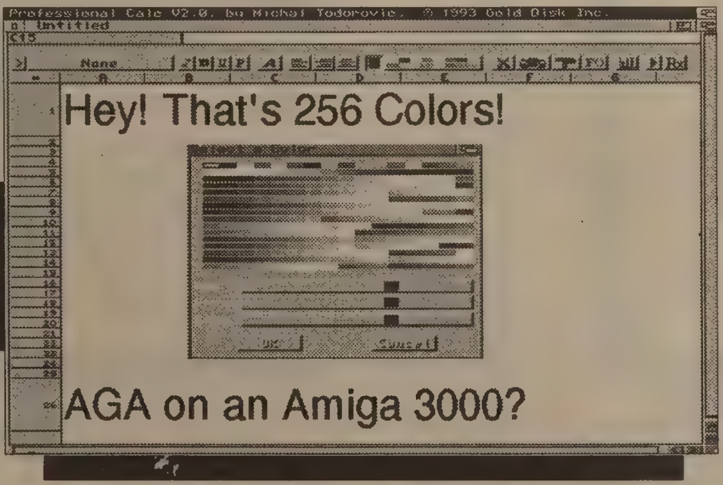
The Retina fits in any Zorro II/III slot and does not require use of the video slot. This means that you can use it in conjunction with video cards like the Video Toaster and OpalVision. Installation is simple and pretty much a plug-and-go endeavor. The video connector is a standard 15-pin VGA configuration. The hardware requirements are 1MB of chip RAM, at least 2MB of fast RAM, and a hard drive.

SOFTWARE

Operating Retina requires two main software programs.

First, you need to run RetinaScreenMode. This allows you to identify the monitor connected to the Retina. A scrollable list of monitors appears on the left side of the program window. If you're lucky, your monitor will appear in the list. If it isn't there, you can select a monitor in the list whose horizontal and vertical scanning frequencies are as close as possible to yours. Alternatively, you can click in the frequency gadgets and type in your own values. Based on your monitor's capabilities, the right side of the program window lists the possible resolutions for 8-bit, 16-bit, and 24-bit display modes.

There are two types of display modes listed: groups and individual. Picking an individual display mode from the long list can be confusing. This is where groups come in to play. If a group is selected, the software assumes that a user wants the maximum possible vertical frequency for a given resolution and automatically picks the display mode. Although some of the screen modes are interlaced, the vertical frequency is usually high enough that the display will still appear solid.



Professional Calc V2.0, by Michal Todorovic, © 1993 Gold Disk Inc.

Untitled

Hey! That's 256 Colors!

AGA on an Amiga 3000?

The RetinaEmu program is the heart of Retina. This program keeps a dynamic list of all screens opened. Most programs open their own screen, unless they open a window on an existing screen (e.g., some programs open right on the Workbench). Many programs, like Art Department Professional, open more than one screen. RetinaEmu identifies screens by their public name, their screen name, and their program name. Except for public screens, which are a recent AmigaDOS innovation, identifying screen names is not an exact science. However, this three-way approach should cover just about any circumstance.

Retina needs to know what display mode should be used for every screen in the list. The Default entry in the screen list provides the settings for new screens that are not already defined in the list. Choosing a group screen mode for the default works best. If the default setting is not acceptable, you just open up the RetinaEmu window and specifically set the desired display mode.

Due to an oversight, standard Amiga resolutions were not included in the display mode list. This only creates a minor annoyance, however. For example a 640 x 400 screen shown on a 724 x 482 display will not fill the entire display. Functionally, it is fine; it just looks a little weird. Using a provided utility, you can manually create these resolutions and make them available for use. Alternatively, you could play with your monitor's display size controls. You may end up adjusting these controls anyway, depending on how your monitor reacts to the changing display frequencies used by the different display modes.

A PERFECT WORLD?

Of course it's not perfect (you knew this was coming, right?). Some programs use "illegal" display routines. Often these can be made to run by using the refresh option for the screen. This option will read the settings from the Amiga's graphic chips and transfer them to the Retina. This can be done at various selectable intervals. Ideally, if refresh was necessary, you'd want it done often; however, it should be noted that this will take more CPU time.

Other programs work directly with the Amiga graphics chips. If this is the case, these screens probably cannot be emulated on the Retina screen. However, there is a provision that allows screens to be sent to the Amiga video out instead of the Retina. Obviously, this will require either using a separate monitor or a switch box.

Programs like ImageFX from GVP use multiple-overlapping screens. Since Retina does not support overlapping screens, programs that do this will not work properly. I've been told that GVP is considering making a version that uses windows on a single screen in place of the multiple screens. ImageFX works fine, however, if the Workbench screen option is used.

WORKBENCH

Workbench can also be run in high resolution. Once you've set the Retina display mode you want, the only trick is that you need to run the Amiga Screenmode preference utility. The actual Amiga screen mode is essentially ignored—only the screen width and height are important. Click the default checkmarks off and change the width and height to match the Retina resolution. You must also turn on the auto-scrolling option. After you exit Screenmode, the Workbench will resize to the Retina resolution.

What benefit does a large Workbench screen give you? Basically, more elbow room, just as going from a non-interlaced 640 x 200 Workbench to an interlaced 640 x 400 Workbench gives you more space to open drawers and windows. For example, an 800 x 600 Workbench will give you nearly twice as much space as a 640 x 400 resolution. It is important to note that the entire 800 x 600 screen appears on your monitor. You do not have to scroll around.

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They said it couldn't be done—AGA could not be added to pre-model 4000 Amigas. Wrong. RetinaEmu provides a way to trick an application into thinking it is running on an AGA machine.

First you need to turn the global AA emulation setting on in RetinaEmu. (AA was the original name for AGA.) Now each screen can be individually set to provide more colors. Say we wanted to run Workbench using 256 colors. First we select the Workbench entry in the screen list and set "more colors" on. Now when we run the Amiga Screen mode preference utility something magical happens. The screen mode descriptions now shows that it supports 256 colors and the slider gadget now goes all the way to 256! Running a utility provided with the Retina, a small palette window can be brought up that shows all 256 colors on the Workbench. Some of the programs I've also gotten the AGA emulation to work with include Deluxe Paint IV AGA, Art Department Professional v2.3, and Professional Calc.

Running any program in 256 colors slows things down considerably. Even on the Amiga 4000, due to DMA contention, the new flicker-free double-NTSC display modes are not as fast as people expected. That's why there's actually a need for an A4000 de-interlacing card. A de-interlaced display would be much faster than an equivalent double-NTSC.

The Retina does not suffer from DMA contention, since it completely shuts down the Amiga display, and no de-interlacing hardware is required either. Performance is totally CPU dependent. MacroSystem tells me that the display of an Amiga 2000 equipped with a fast '040 CPU will be faster than a 4000's. Even on an Amiga 4000, the Retina display will outperform a comparable AGA display. I found that for programs that did not require the refresh option, the Retina display on my A3000 was much snappier than the normal Amiga display. This should hold true for any Amiga model.

DEVELOPER SUPPORT

Because of the relatively low cost and high performance of the Retina, many companies are starting to support it. A new version of TV Paint, also distributed by MacroSystem, a very powerful 24-bit paint package, now directly supports the Retina. An upcoming version of VistaPro from Virtual Reality Labs will also do so. An ImageFX render module is in the works, as well as a special version of Black Belt's Imagemaster. Scala is also supposedly interested.

It is important to note that for a program to be compatible with the Retina, the only general requirement is that it has to be written using standard Amiga function calls. As a result, the program will still operate without a Retina. This should make developers very happy and encourage support for the board.

Most of the programs I tried ran perfectly.

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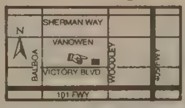

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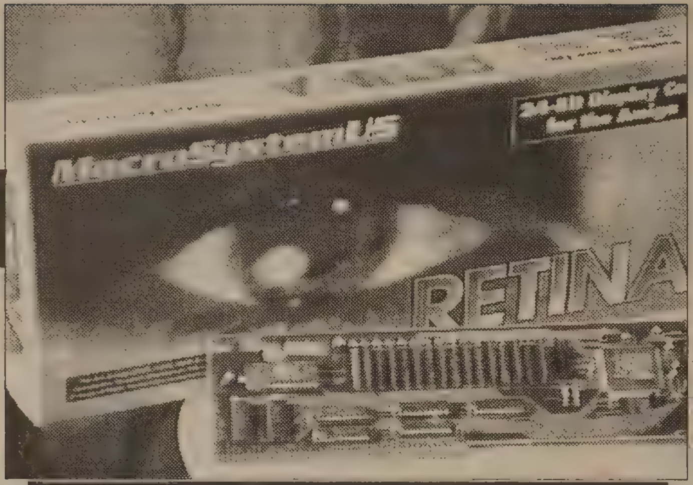

Of course programs won't take full advantage of the Retina unless they write a special version for it. Developer information is included right on the program disk.

Provided with the Retina is an ADPro saver which will show any image on the Retina display. A driver for Black Belt System's Imagemaster is included as well. Applications written for the Harlequin graphics card by Amiga Centre Scotland can be used too. Retina also comes with a few utility programs, including a nice display program and 24-bit paint package.

FUTURE RELEASE

The next major software upgrade will feature a totally rewritten interface. There will also be support for virtual screens. With an 800 x 600 viewable display, you will be able to scroll around a 24-bit 1280 x 1024 image! The viewable display can be 1280 x 1024 with a whopping 2048 x 2048 256-color image!

This release will also have support for multiple 24-bit windows running on top of a four-color Workbench. The windows can be moved and resized even while showing animations. The incredible part is that Workbench will still operate at top speed because it is only using four colors!

The Retina integrates into the Amiga operating system nearly seamlessly and offers an affordable solution to getting a true 24-bit display on the Amiga. Though it operates fine on a 1960, this product just screams for a large high-resolution monitor. The Retina provides faster screen updates, higher resolutions, and more colors for all slot-equipped Amigas including the 4000. It is only the odd program here and there that may still necessitate a two-monitor setup. Because it is compatible with most existing software, it could become the 24-bit standard for the Amiga.

(A special thanks to Martin and Vince at TS Computers in North Hollywood for repairing my Amiga 3000, allowing me to meet my deadline.)■

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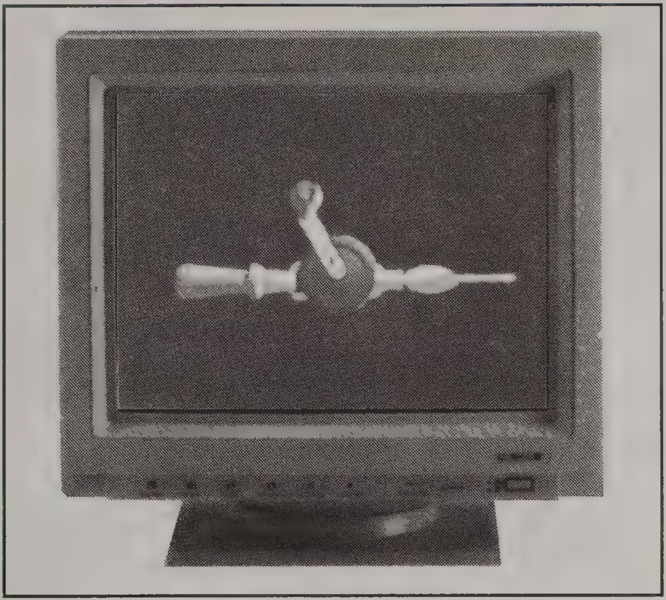
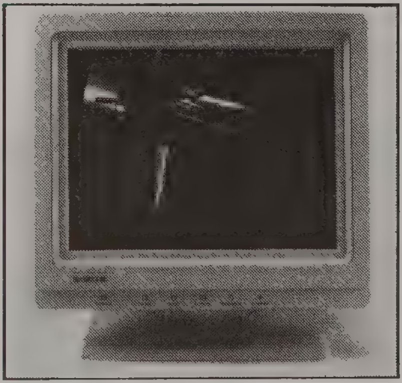


- Horizontal Frequency: 27-80KHz
- Resolution: Maximum 1600x1280 (Non-Interlaced) .28mm CRT
- Compatible With Apple Mac II
- Refresh Rate: 70Hz at 1280x1024
- VESA Standard

SRC-1403/SRC-1501 14", 15" HYPER VGA III

- Horizontal Frequency: 28-64KHz
- Resolution: Maximum 1280x1024 (Non-Interlaced) .28mm CRT
- Compatible With Apple Mac II
- Refresh Rate: 70Hz at 1024x768
- VESA Standard
- Automatic Pin Cushion Compensation



SRC-1451 14" HYPER VGA I

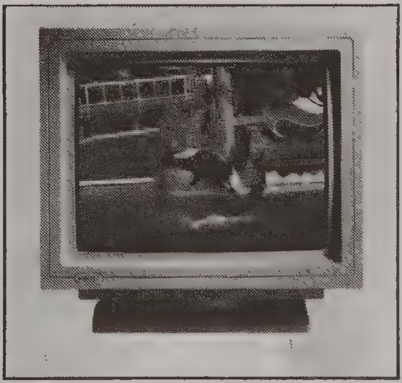
- Horizontal Frequency: 30-38KHz
- Resolution: Maximum 1024x768 (Interlaced) .28mm/.39mm CRT
- Full Screen
- Universal Power Supply 110/220
- Compatible With Apple Mac II
- Low Radiaton Options

SRC-1452 14" HYPER VGA II

- Horizontal Frequency: 30-38KHz, 47-50KHz
- Resolution: Maximum 1024x768 (Non-Interlaced) .28mm CRT
- Full Screen
- Universal Power Supply 110/220
- Compatible With Apple Mac II

SRC-1901 20" HYPERSCAN COLOR UNITS

- Horizontal Frequency: 27-72KHz
- Resolution: Maximum 1280x1024 (Non-Interlaced) .31mm CRT
- DBF (Dynamic Beam Forming)
- BNC And D-Sub (9-Pin) Input
- Compatible With SPARC Station 1152x900 And Apple Mac II 1152x870 (Dual Page)



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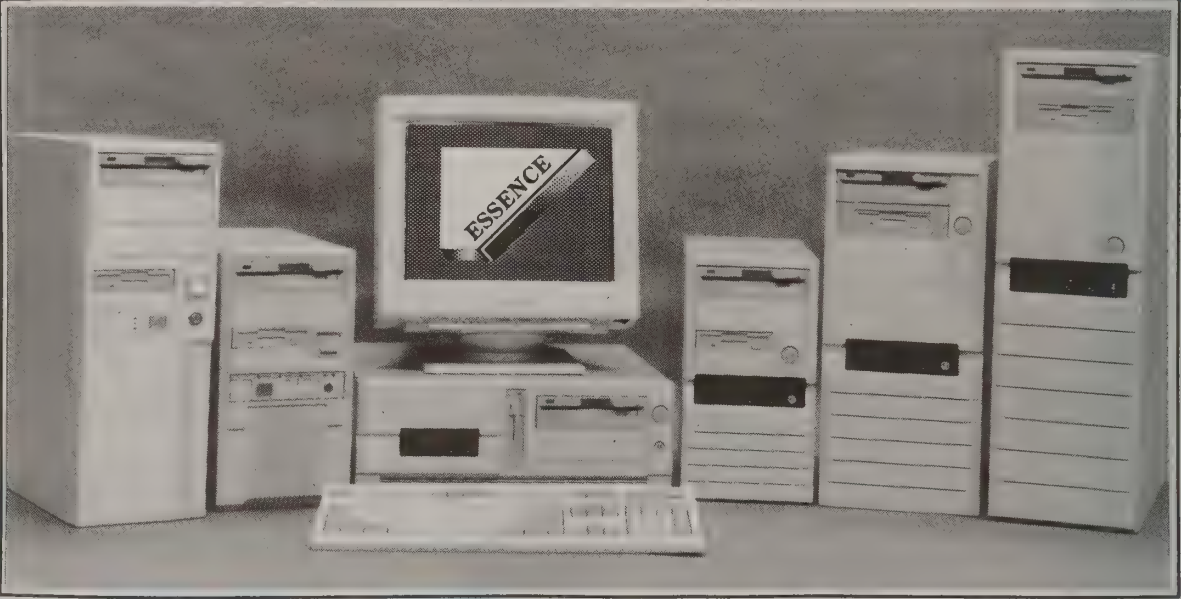


Orchid Local Bus

Made in USA

VESA (Bus Master)

486DX2-66 .... $1430
486DX-50 .... $1350
486DX-33 .... $1190

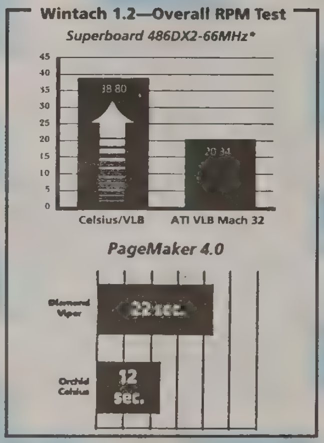
- Orchid 486DX VESA Local Bus M/B
- 256K High Speed Cache
- 4MB Memory on board exp. up to 32MB
- TEAC 1.2M & 1.44M FDD
- 32-Bit Orchid Fahrenheit VLB Accelerator w/1MB
- 32-Bit Orchid VLB IDE Controller
- 2 Serial / 1 Parallel / 1 Game
- CS-230 Mid-Veritcal Case
- 250 Watts UL Power Supply
- Enhanced 101 Keys Keyboard

New ORCHID Celsius/VLB
"Faster than Ever"

- out performs ATI VLB mach32

The Orchid Celsius/VLB is a Windows accelerator for 486 personal computers that provides direct support for the VESA Local Bus (VL-Bus) standard. It combines a Graphical User Interface (GUI) accelerator for incredible speed, flicker-free 90Hz support, 16.8 million true colors, high resolution graphics (1280x1024x16 colors, non-interlaced) and full VESA compliance at an affordable price. In addition to the Windows drivers, the Celsius/VLB comes with high performance 32-bit AutoCAD Display List Drivers.

$240.



Vega VESA Local Bus

Made in USA

486DX2-66VLB .. $1380
486DX-50VLB ... $1300
486DX2-50VLB .. $1250
486DX-40VLB ... $1170
486DX-33VLB ... $1140

- Vega 486DX VESA Local Bus M/B, w/P5 ZIF Socket
- 256K High Speed Cache
- 4MB Memory on board exp. up to 64MB
- TEAC 1.2M & 1.44M FDD
- 32-Bit Orchid Fahrenheit VLB Accelerator w/1MB
- 32-Bit VLB IDE HDD Controller
- 2 Serial / 1 Parallel / 1 Game
- Mid-Veritcal Case
- 230 Watt Power Supply
- Enhanced 101 Keys Keyboard

Vega ISA Bus

Made in USA

486DX2-66V $1210
486DX-50V $1130
486DX2-50V $1055
486DX-40V $975
486DX-33V $940
486SX-33V $840
486SX-25V $725
486DLC-40V $790
486DLC-33V $760
386DX-40V $670

- Vega 386/486DX ISA M/B
- 256K Cache for ***DX2-66/DX50***
- 64K Cache for all others
- 4MB Memory exp. to 32MB
- TEAC 1.2M & 1.44M FDD
- 2 Serial / 1 Parallel / 1 Game
- Mid-Veritcal Case
- 230 Watt Power Supply
- Enhanced 101 Keys Keyboard

AIR VESA Local Bus

486DX2-66VLB .. $1405
486DX-50VLB $1325
486DX2-50VLB .. $1275
486DX-40VLB $1195
486DX-33VLB $1165

- AIR 486DX VESA Local Bus M/B
- 256K High Speed Cache
- 4MB Memory on board exp. up to 64MB
- TEAC 1.2M & 1.44M FDD
- 32-Bit Orchid Fahrenheit VLB Graphics Accelerator w/1MB
- 32-Bit VLB IDE HDD Controller
- 2 Serial / 1 Parallel / 1 Game
- Mid-Veritcal Case
- 230 Watt Power Supply
- Enhanced 101 Keys Keyboard

AIR EISA/VESA Local Bus

486DX2-66EVLB $1710
486DX-50EVLB $1630
486DX2-50EVLB $1580
486DX-40EVLB $1500
486DX-33EVLB $1470

- AIR 486DX EISA/VESA Local Bus M/B, w/ ZIF Socket 8 EISA Slots, 3VLB Slots
- 256K High Speed Cache
- 4MB Memory on board exp. up to 128MB
- TEAC 1.2M & 1.44M FDD
- 32-Bit Orchid Fahrenheit VLB Graphics Accelerator w/1MB
- 32-Bit DTC2290 EISA/IDE Controller
- 2 Serial / 1 Parallel / 1 Game
- Mid-Veritcal Case
- 230 Watt Power Supply
- Enhanced 101 Keys Keyboard

Essence 486 VESA/EISA Local Bus

486DX2-66HLB ... $1320
486DX2-50HLB ... $1200
486DX-40HLB $1120
486DX-33HLB $1090

- HINT 486DX EISA Local Bus M/B, P24T socket for P5 Chip Add $10. for ZIF Socket.
- 3 Eisa Bus/2 Vesa Local Bus
- 256K High Speed Cache
- 4MB Memory on board exp. up to 32MB
- TEAC 1.2M & 1.44M FDD
- 32-Bit VESA Local Bus SVGA Graphics Card w/1MB
- 32-Bit VLB IDE HDD Controller
- 2 Serial / 1 Parallel / 1 Game
- Mid-Veritcal Case
- 230 Watt Power Supply
- Enhanced 101 Keys Keyboard

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Essence 486 VESA Local Bus

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486DX-50LB	*$1145*
486DX2-50LB	*$1100*
486DX-40LB	*$1020*
486DX-33LB	*$990*

- * VESA 486DX Local Bus M/B add $15. for ZIF Socket
- * 256K High Speed Cache
- * 4MB Memory on board exp. up to 32MB
- * TEAC 1.2M & 1.44M FDD
- * 32-Bit VESA Local Bus SVGA Graphics Card w/1MB
- * 32-Bit VLB IDE HDD Controller
- * 2 Serial / 1 Parallel / 1 Game
- * Mini-Veritcal Case
- * 200 Watt Power Supply
- * Enhanced 101 Keys Keyboard

Essence 486 ISA Bus

486DX2-66	*$1100*
486DX-50	*$1020*
486DX2-50	*$955*
486DX-40	*$875*
486DX-33	*$840*
486SX-33	*$735*
486SX-25	*$635*

- * 486DX/SX ISA M/B
- * 256K Cache for ***DX2-66/DX50***
- * 128K Cache for all others
- * 4MB Memory exp. to 32MB
- * TEAC 1.2M & 1.44M FDD
- * IDE FDD/HDD Controller
- * 2 Serial / 1 Parallel / 1 Game
- * Mini-Veritcal Case
- * 200 Watt Power Supply
- * Enhanced 101 Keys Keyboard

Essence 386 ISA Bus

386DX-40	*$570*
386DX-33	*$590*
386SX-40	*$450*
386SX-33	*$440*

- * 386DX/SX 40/33 ISA M/B
- * 128K Cache on ***DX Systems***
- * OK Cache on ***SX Systems***
- * 4MB Memory on board (2MB for ***SX Systems***)
- * TEAC 1.2M & 1.44M FDD
- * IDE FDD/HDD Controller
- * 2 Serial / 1 Parallel / 1 Game
- * Mini-Veritcal Case
- * 200 Watt Power Supply
- * Enhanced 101 Keys Keyboard

Essence 486DLC ISA Bus

486DLC-40	*$690*
486DLC-33	*$665*

- * 486DLC ISA Bus M/B
- * 128K High Speed Cache
- * 4MB Memory on board
- * TEAC 1.2M & 1.44M FDD
- * IDE FDD/HDD Controller
- * 2 Serial / 1 Parallel / 1 Game
- * Mini-Veritcal Case
- * 200 Watt Power Supply
- * Enhanced 101 Keys Keyboard

For ISA Systems:

14" DigiView 1401 Super VGA Monitor (.39dp) w/AVGA-3 1MB VGA Card	$267
14" DigiView 1428 Super VGA Monitor (.28dp) w/AVGA-3 1MB VGA Card	$305
14" DigiView 1430ni Non-Interlaced Monitor (.28dp) w/AVGA-3 1MB VGA Card	$327
14" CTX-5468A Super VGA Monitor (.28dp) w/AVGA-3 1MB VGA Card	$315
14" CTX-5468NI Non-Interlaced Color Monitor (.28dp) w/AVGA-3 1MB VGA Card	$337
14" CTX-1461 Digital Auto-Tracking Monitor (.28dp) w/AVGA-3 1MB VGA Card	$370
15" CTX-1560 Digital Auto-Tracking Monitor (.28dp) w/Orchid Fahrenheit 1MB Graphics Accelerator	$585
17" CTX-1760 Digital Auto-Tracking Monitor (.28dp) w/Orchid Fahrenheit 1MB Graphics Accelerator	$930
14" ViewSonic 6E Non-Interlaced Color Monitor (.28dp) w/AVGA-3 1MB VGA Card	$355
14" ViewSonic 5E Non-Interlaced Color Monitor (.28dp) w/AVGA-3 1MB VGA Card	$435
17" ViewSonic 7 Digital Auto-Tracking Monitor (.28dp) w/Orchid Fahrenheit 1MB Graphics Accelerator	$1038
15" ViewSonic 15 Digital Multi-Frequency Monitor w/Orchid Fahrenheit 1MB Graphics Accelerator	$655
17" ViewSonic 17 Digital Auto-Tracking Monitor (.28dp) w/Orchid Fahrenheit 1MB Graphics Accelerator	$1203
20" ViewSonic 20 Digital Auto-Tracking Monitor w/Orchid Fahrenheit 1MB Graphics Accelerator	$1823
MAG-15F/H Digital Non-Interlaced Monitor w/Orchid Fahrenheit 1MB Graphics Accelerator	$680
MAG-17F/H Digital Non-Interlaced Monitor w/Orchid Fahrenheit 1MB Graphics Accelerator	$1095

Hard Disk Subsystem

& Other Options (w/Systems):

40MB IDE HDD	$124
80MB IDE HDD	$172
120MB IDE HDD	$183
170MB IDE HDD	$208
200MB IDE HDD	$232
240MB IDE HDD	$258
340MB IDE HDD	$330
520MB IDE HDD	$685
MicroSoft DOS 6.0	$40
MicroSoft Windows 3.1 w/Mouse	$58
Internal 2400 Buad Data Modem	$29
Internal 9600/2400 Baud Fax Modem	$52
Internal 14400/14400 Baud Fax Modem	$158
Mitsumi CRMC Intremal CD-ROM	$195
Sound Blaster Pro	$136
Media-Vision Pro Audio Spectrum 16 Sound Card	$178
Orchid Sound Producer Pro w/Speaker & Mic	$99
Power Center (UL)	$16
Mitac Multimedia Starter Kit	$390

-Mitsumi CRMC Internal CD-ROM (350ms)
-Sound Blaster Pro compatible sound card
-5 CD Titles: Compton's Multimedia Encyclopedia for Windows, The KGB/CIA World Fact Book, Dictionary of the Living World, Grammy Awards, & CD-ROM Software Jukebox
-and a pair of speakers

For EISA & VESA Local Bus Systems:

ViewSonic 6E 14" Non-Interlaced Monitor	$300
ViewSonic 5E 14" Non-Interlaced Monitor	$380
ViewSonic 7 17" Digital Multi-Freq Monitor	$883
ViewSonic 15 15" Digital Multi-Freq Monitor	$500
ViewSonic 17 17" Digital Multi-Freq Monitor	$1048
ViewSonic 20 20" Digital Multi-Freq Monitor	$1668
CTX-5468NI 14" Non-Interlaced Monitor	$282
CTX-1461LR 14" Non-Interlaced Monitor	$315
CTX-1560LR 15" Digital Non-I Monitor	$430
CTX-1760LR 17" Digital Non-I Monitor	$775
MAG 1564 15" Digital Non-Interlaced Monitor	$435
MAG 15F/H 15" Digital Non-Interlaced Monitor	$525
MAG 17F/H 17" Digital Non-Interlaced Monitor	$940
Mitac MagicView 1564 15" Digital NI Monitor	$395
Mitac STA-728 17" Non-Interlaced Monitor	$680
NEC 3FGe Multi-Frequecny Monitor	$625
NEC 4FGe Multi-Frequecny Monitor	$740
NEC 5FGe Multi-Frequency Monitor	$1125
Qptiquest 1000S 14" NI Monitor	$281
Optiquest 1500D 14" Digital NI Monitor	$370
Optiquest 2000DX 15" Digital NI Monitor	$397
Optiquest 4000D 17" Digital NI Monitor	$805

Tape Backup:

Archive 9250i 250MB Tape Backup	$175
Colorado DJ-10 120MB Tape Backup	$156
Colorado DJ-20 250MB Tape Backup	$184
Colorado JT-10 120MB Parallel Tape Backup	$305
Colorado JT-20 250MB Parallel Tape Backup	$365

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Conditions:

All parts and systems carry a one year limited warranty except for monitors and printers which are warranted by manufacturers. Any consumable products are not returnable nor refundable. Any opened software is non-refundable. All sales on monitors & printers are final. Repairs need to be sent to the manufacturer. No refund. All returns are subject to our approval and must have prior authorization return items must be in its original condition with invoice. Send shipping prepaid. All refunds or credits are less shipping and bank charges. All refund items must be returned within 14 days of invoice. There will be a 20% restocking fee after the 14 day period and within 30 days of invoice. Thereafter only exchanges and repair for the rest the warranty period. Price, specification and availability subject to change without any notice.

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- SONY CDU-31A Internal CD-ROM Drive - 490ms
- Sun Moon Star stereo sound board with sound utilities and built-in CDU-31A interface, Sound blaster Pro Basic compatible
- 5 leading multimedia CD titles - Multimedia Encyclopedia '92, World Atlas, U.S. Atlas, Chessmaster 3000 and Beacon's Typing Program
- A pair of Mini Speakers

Mitac Multimedia Upgrade Kit $395.00
- Mitsumi Internal CRMC CD-ROM (350ms, Kodak Photo CD compatible)
- Sound Galaxy NX Pro Sound Card
- Shielded Stereo Computer Speakers
- Software bundled: Compton's Multimedia Encyclopedia for Windows, The KGB/CIA World Factbook, Dictionary of the Living World, Grammy Awards, CD-ROM Software Jukebox

Creative Labs Discovery CD 8 Upgrade Kit (Internal) $405.00
- **Sound Blaster Pro** Stereo Sound Card
- Creative Labs Internal CD-ROM (Panasonics CD-ROM), 64KB Buffer, 150KB/sec Data Transfer, 390ms Access rate, Photo CD compatible
- A pair of Stereo Speakers
- Software bundled: Multimedia Encyclopedia, The Animals!, Lemmings

Creative Labs Discovery CD 16 Upgrade Kit (Internal) $475.00
- **Sound Blaster 16** Stereo Sound Card
- Creative Labs Internal CD-ROM (Panasonics CD-ROM), 64KB Buffer, 150KB/sec Data Transfer, 390ms Access rate, Photo CD compatible
- A pairs of Stereo Speakers
- Software bundled: Multimedia Encyclopedia, The Animals!, Lemmings

Creative Labs Eduaterment CD 8 Upgrade Kit (Internal) $465.00
- **Sound Blaster Pro** Stereo Sound Card
- Creative Labs Internal CD-ROM (Panasonics CD-ROM), 64KB Buffer, 150KB/sec Data Transfer, 390ms Access rate, Photo CD compatible
- A pairs of Stereo Speakers
- Software bundled: The San Diego Zoo Presents ... The Animals!, Where in the World is Carmen Diego?, Multimedia Enclopedia, Just Grandma and Me, The Secret of Monkey Island, Loom, Secret Weapons of the Luftwaffe, Sherlock Holmes - Consulting Detective

Creative Labs Eduaterment CD 16 Upgrade Kit (Internal) $535.00
- **Sound Blaster 16** Stereo Sound Card
- Creative Labs Internal CD-ROM (Panasonics CD-ROM), 64KB Buffer, 150KB/sec Data Transfer, 390ms Access rate, Photo CD compatible
- A pairs of Stereo Speakers
- Software bundled. The San Diego Zoo Presents ... The Animals!, Where in the World is Carmen Diego?, Multimedia Enclopedia, Just Grandma and Me, The Secret of Monkey Island, Loom, Secret Weapons of the Luftwaffe, Sherlock Holmes - Consulting Detective

Media Vision Fusion CD 16 (Internal) $495.00
- SONY CDU-31A Internal CD-ROM Drive - 490ms
- Media Vision Pro Audio 16 Stereo Sound Card
- High-quality Labtec Amplified Speaker System
- Software bundled: Carmen San Diego, Compton's New Media, Wing Commander II, Ultima Underworld

Media Vision Fusion CD 16 (External) $475.00
- NEC External CD-ROM Drive
- Media Vision Pro Audio 16 Stereo Sound Card
- High-quality Labtec Amplified Speaker System
- Software bundled: Carmen San Diego, Compton's New Media, Wing Commander II, Ultima Underworld

Media Vision Fusion DoubleCD 16 (Internal) $615.00
- NEC CDR-55J Internal CD-ROM Drive - 350ms
- Media Vision Pro Audio 16 Stereo Sound Card
- High-quality Labtec Amplified Speaker System
- Software bundled: 7th Guest, Battle Chess, Compton Interactive Encyclopedia, Arthur's Teacher Trouble

Media Vision Pro-16 Multimedia System II $895.00
- NEC CDR-84 Internal SCSI CD-ROM (Multi-Session, 280ms)
- Media Vision **Pro Audio Studio 16** Stereo Sound Card
- Software bundled: Carmen San Diego, Compton's Encyclopedia, Lotus 1-2-3, King's Quest V, Nautilus CD, and MacroMind Action! CD

Media Resource Pro-16 Multimedia System $645.00
- Toshiba 3401B Internal SCSI CD-ROM (Multi-Session, 200ms)
- Media Vision Pro Audio Spectrum 16 Stereo Sound Card
- A pair of Speakers

Media Resource Digital Multimedia System $715.00
- Toshiba 3401B Internal SCSI CD-ROM (Multi-Session, 200ms)
- Media Master Digital 16 Stereo Sound Card (Ad-Lib Module)
- A pair of Stereo Digital Sound Speakers

CD-ROMS

Mitsumi CRMC Internal CD-ROM w/Interface (350ms)	$195.00
NEC CDR-74-1 External SCSI CD-ROM (280ms)	$590.00
NEC CDR-84-1 Internal SCSI CD-ROM (280ms)	$470.00
Panasonic CR-522-B Internal CD-ROM w/Interface	$235.00
Panasonic CR-562-B Internal CD-ROM (Double spin) w/Interface	$295.00
SONY CDU-31A Internal CD-ROM w/Interface	$215.00
SONY CDU-31A External CD-ROM w/Interface	$295.00
TEXEL DM3024 Internal SCSI CD-ROM w/Interface	$420.00
TEXEL DM3024 Internal SCSI CD-ROM (265ms)	$395.00
TEXEL DM5024 External SCSI CD-ROM	$520.00
Toshiba 3401B Internal SCSI CD-ROM	$450.00
Toshiba 3401B Internal SCSI CD-ROM w/Interface	$485.00

SOUND CARDS

Creative Lab Sound Blaster Deluxe	$85.00
Creative Lab Sound Blaster Pro Deluxe	$136.00
Creative Lab Sound Blaster 16 ASP	$240.00
Creative Lab Video Blaster w/Microsoft video for Win	$355.00
Media Vision Pro Audio Spectrum 16 Sound Card	$178.00
Media Vision Pro Audio Studio 16 Sound Card	$235.00
Media Vision Pro Movie Spectrum Video Capture card	$325.00
Orchid Sound Producer Pro w/Mic & Speaker	$99.00
Sound Blaster Pro w/SONY-31A CD-ROM Interface	$120.00

SPEAKERS & ACCESSORIES

Labtec AM-22 Deluxe Microphone	$13.95
Labtec C-10 Computer Stereo Headphone	$14.95
Labtec CS-150 Shielded Amplified Stereo Speakers	$19.50
Labtec CS-180 Shielded Amplified Stereo Speakers	$23.50
Labtec CS-550 Shielded Amplified Stereo Speakers w/Built-in Power Boosters	$27.50
Labtec SS-700 Shielded Amplified Stereo Speakers w/3 Band E/J	$32.50
Labtec CS-800 Shielded Amplified Stereo Speakers w/AC Adapter (5 Watts)	$39.50
Labtec CS-1000 Shielded Amplified Stereo Speakers	$95.00
Labtec AD-4 400mA AC Adapter (for Speakers System)	$9.95
Zoltrix ZX-55 Mini Speakers	$9.95
Zotlrix ZX-28 Shielded Amplified Stereo Speakers w/3 Band E/J	$27.95

CD TITLES

CD Pak for DOS $88.00
- 6 Titles: Multimedia Encyclopedia, The Animals!, Reference Library, US Atlas, World Altas, & The Secret of Monkey Island

CD Pak for Windows $88.00
- 6 Titles: Multimedia Encyclopedia, The Animals!, Chessmaster 3000, US Atlas, World Atlas, & Beacon Teaches Typing 2.0

CD Pak for Home $70.00
- 5 Titles: Tempra Access Photo CD, The Animals!, US Atals, World Atlas, & Mayo Clinic

CD Pak for Entertainment $70.00
- 5 Titles: Mario is Missing, D/Generation, Chessmaster 3000, Wind Commander / Ultima VI, & The Secret of Monkey Island

CD Quartet 1 .... $38.00
- US Atlas, World Atlas, Chessmaster 3000, Mavis Beacon Teaches Typing

CD Quartet 2 .... $43.00
- US Atlas, World Atlas, Reference Labrary, Secret of Monkey Island

BUSSINESS

American Bus Phone Book - 1992 (DOS)	$27.00
Authorware Star (MPC)	$52.00
Business & Economy Atlas (DOS)	$29.00
Kodak Photo CD (MPC)	$25.00
Lotus 1-2-3 V3.1 (MPC)	$89.00
Macromind Action (MPC)	$36.00
Marketing Master 1992 (DOS)	$28.00
Microsoft Works (MPC)	$50.00
Publish It 2.0 (DOS)	$27.00
TEMPRA Access Photo CD Imaging Software (DOS)	$24.00

EDUCATION

Animals! (MPC)	$24.00
Annabel's Dreams (MPC)	$85.00
Arthur's Teacher Trouble (MPC)	$32.00
Audubon's Mammals (DOS)	$31.00
Audubon's Birds (DOS)	$31.00
Barron's College Guide (MPC)	$29.00
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Carmen San Diego (DOS)	$30.00
Choose your College	$21.00
Collection of PC Graphics (DOS)	$22.00
Composer Quest (MPC)	$34.00
Compton's Encyclopedia (MPC)	$64.00
Corp Snapshot (DOS)	$36.00
Dictionary of the Living World (MPC)	$34.00
Dinosaur Adventure (MPC)	$32.00
DTP Pro FM - Wave Clipart	$26.00
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Great Cities - Vol. 2 (DOS)	$28.00
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Library of Future 1st (DOS)	$51.00
MacMillan Dictionary for Children (MPC)	$34.00
Mavis Beacon Teaches Typing (MPC)	$27.00
Media Clips - Jets,Props,View,Place (MPC)	$46.00
Microsoft BookShelf (MPC)	$50.00
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Playing Language - French (DOS)	$30.00
Playing Language - Germany (DOS)	$30.00
Playing Language - Japanese (DOS)	$30.00
Playing Language - Spanish (DOS)	$30.00
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Renaissance Master II (MPC)	$34.00
Illustrated Works of Shakespeare	$23.00
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Sound Library (MPC)	$21.00
Survey of Western Arts (MPC)	$34.00
TIME Almanac - 1991 (DOS)	$32.00
Time Table of History (DOS)	$21.00
Toolworks Multimedia Encyclopedia (MPC)	$57.00
Toolworks Reference Library (DOS)	$25.00
U.S. Atlas & Automap (DOS)	$28.00
Atlas Pak - US / World Atlas (DOS)	$23.00
U.S. Histroy (DOS)	$28.00
USA Wars: Civil War (DOS)	$46.00
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EFAR Baby 486DX2-50MHz **VESA Local Bus** M/B w/**256K** Cache	$565.00
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OPTI Mini **486DX2-66**MHz **VESA Local Bus** M/B w/**256K** Cache	$657.00
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VEGA Baby **486DX2-66**MHz **EISA** M/B w/**256K** Cache (USA made)	$870.00
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OPTI Baby 486DX-50MHz **EISA Local Bus** M/B w/**256K** Cache	$680.00
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EFAR Baby (3)**486DX2-66**MHz M/B w/**256K** Cache (USA made)	$645.00
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Diamond Stealth-24 1MB Windows Accelerator (16 Million colors)	$168.00
Diamond Stealth Pro Graphics Accelerator w/1MB VRAM	$255.00
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ADAPTEC AHA-1542BK SCSI Bus Master Host Adapter Kit	$240.00
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ADAPTEC AHA-1542CK SCSI Bus Master Host Adapter Kit	$260.00
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Sony CPD-1430 14" MultiScan Monitor (Non-Interlaced, .25dp)	$597.00
Sony CPD-1730 17" MultiScan Monitor (Non-Interlaced, .25dp)	$1043.00
Sony CPD-2036S 20" MultiScan Monitor (non-Interlaced, .30dp)	$1995.00
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**** Please call for Hitachi, Mitsubishi, Radius, Seiko & SuperMac Monitors prices*

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SyQuest SQ800 88MB Cartridge	$108.00
SyQuest SQ310 105MB 3.5" Cartridge	$90.00
SyQuest SQ01 SCSI Adapter w/Software	$45.00
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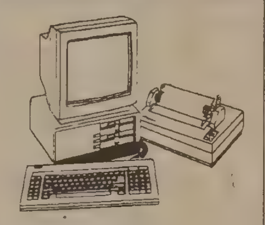

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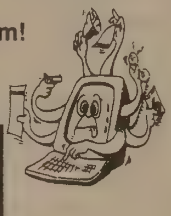

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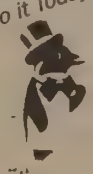

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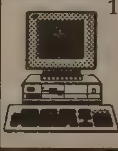

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continued from page 117

90065, Los Angeles, CA 90009. Call: Fred Duffy, (310)475-8400. BBS: (310)454-4660. [Exp. #113.]

South Bay Apple Macintosh User Group. Meetings: Last Wed., 7:30 pm, Pacific Elementary School, 1214 Pacific Ave., Manhattan Beach. Call: (310)644-3315. [Exp. #115.]

MULTIMEDIA

The International Interactive Communications Society, LA Chapter. Meetings: 7:30 pm, Electronic Cafe, 1649 18th St., Santa Monica. Free for members, $10 for nonmembers. Call: (310)535-1293. [Exp. #116.]

Multimedia Audio Technology Group. Multiple platform, multimedia audio presentations. Call: Chris Palmer, (818)364-2577. [Exp. #116.]

NEXTSTEP

Southern California NeXTSTEP User Group. Meetings: throughout LA County. Call: Mike Mahoney, (310)985-1550. Email: mahoney@csulb.edu. [Exp. #116.]

OS/2

West LA OS/2 User Group. Meetings: 1st Wed., 7:30 pm, IBM, 2525 Colorado Place, Santa Monica. Catering to the technical needs of the corporate community. Call: Tracy Ragan, (310)285-3155. [Exp. #112.]

PROGRAMMING LANGUAGES

Business BASIC Users Of Southern California (BBUSC). Meetings: 6:00 pm, Cerritos Sheraton, Cypress Rm., 12725 Center Court Dr., Lakewood. An executive forum for business solutions using Business Basic software. Call: Christian Brantley, (714)379-5454. [Exp. #115.]

San Fernando Valley C++ User Group. Meetings: 7:00 pm, HP Bldg., Van Nuys. Speakers, discussions, demon., etc. on C++ and OO technology. Call: (818)332-8879. [Exp. #116.]

SGML

SGML (Standard Generated Markup Language) User Group, Southern California Chapter. Discussions, presentations, tutorials, networking, and educational forums applying to SGML. Call: Roger Watson, (310)337-0309. [Exp. #116.]

TEXAS INSTRUMENTS

UGOC. Meetings: 2nd Mon., Fidelity Federal, 13820 Seal Beach Blvd. Call: John Bolda, (310)421-1827. [Exp. #113.]

VIDEO TOASTER

Digital Video Forum. Meetings: 3rd Wed., 6:00 pm, Pacific Video Products, 1100 Gene Autry Way, Anaheim. The Video Toaster and associated devices and software is the primary interest. Broad focus of group is the rapidly evolving world of Video/Graphics. Call: Scott Davis, (714)647-5822. [Exp. #112.]

VIRTUAL REALITY

Virtual Reality Special Interest Group (VRSIG). Meetings: The Electronic Cafe, 1649 18th St., Santa Monica. Call: Dave Blackburn, (310)545-0369. [Exp. #112.]

ASSOCIATIONS

Independent Computer Consultants Association, Los Angeles Chapter. Meetings: 1st Thurs., 6:00 pm. Prepaid reservation, $25, or at the door, $35. The LA chapter provides referral services. Call: (213)872-1811. [Exp. #116.]

Orange County Association Of PICK Professionals. Meetings: 3rd Wed., 6:00 pm. Dinner: Members, $25; nonmembers, $30. Without reservations add $5. Call: (714)557-9229. [Exp. #113.]

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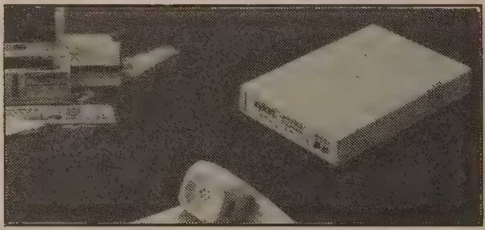

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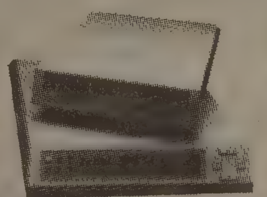

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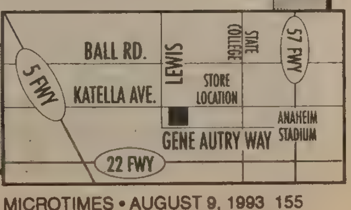

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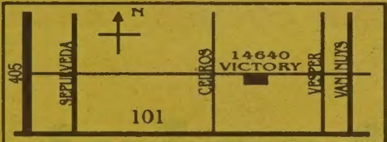

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Oh, Not Again! Abducted By Aliens

Or
IBM Secret Factoid Revealed

BY JOHN C. DVORAK

It happens this time of year whether I like it or not. I'm abducted by aliens. It's a good thing too, since this is the slow time where my ability to write about anything substantive is just about nil. Things perk up in about two months. Until then, I'm saved by aliens...er, I mean abducted.

Actually I wasn't expecting to be abducted this last week. I had plenty of things to do and had just lost the hard disk on my Quadra 700. What a drag.

DVORAK'S LAST COLUMN

So I wasn't in a good mood when there was a knock on the door. I opened it to find Daehtihs and Norom, two aliens I'd encountered a year earlier when their planet needed some consulting on whether to use OS/2 or wait for Windows NT.

Norom spoke. "You must come with us Devoraky. Our planet is in turmoil over the Windows NT beta. There is a revolution, civil war, divorces, curdled milk, rotten hamburger, chiseled plastic, broken boxes, mangled flesh." His English wasn't that good. I slapped him. "Pull yourself together," I said.

Daehtihs held up a ray gun. It looked nasty. "You must come now, no time to waste."

"What are you going to do to me if I say no? Does that gun actually work? The last time you pulled a gun on me it was just a cigarette lighter."

The little bug-eyed guy pointed the gun at my collection of lizard heads and pulled the trigger. A beam shot from the muzzle of the gun and vaporized the collection in an instant. I decided to go with them, if for no other reason than to complain about the collection being destroyed. "Do you know how hard it is to get a beaded lizard head?"

The aliens couldn't care less about the collection as they walked me to the saucer which was poised about 200 feet over my driveway. "How long will we be gone?" I asked. No answer. These guys weren't in the mood for chit-chat, I could tell. Usually they ask for some strawberry ice cream, a favorite of all the bug-eyed aliens it seems. This time, nothing.

We walked under the saucer, from which a green beam emerged, drawing us up into the vehicle. In an instant we were buzzing through space at speeds beyond measure.

The two creeps escorted me into a waiting room and locked the door. When I turned to find someplace to sit I was stunned. Sitting there, rocking to and fro, with his arms crossed, was Bill Gates! No kidding.

Not looking up or offering to shake hands he kept rocking. "Hello, Dvorak...what are you doing here?"

"Probably the same as you. To consult with the aliens. Right?"

"About what?"

"Windows vs. OS/2 I guess."

Gates looked up and stopped rocking. "I want them to vaporize Berkeley Breathed, that damned cartoonist. I'm not as homely as he makes me look in that crummy cartoon of his. The guy is off the deep end."

"You're here to hire a hit alien?"

"No, I'm here to do a licensing deal with the aliens. I just wish they'd vaporize the bastard on their own. Or at least give him one of those implants and get him under better control."

"What implants?"

Gates looked quizzical. He came over to me and looked carefully between my eyes, around my nose, and behind my ear. "I'll be damned. I thought everyone had the implant. You don't?"

"You do? Why?" I was now looking closely at him to see if there was any marking I could identify as an implant point. Of course, I had no idea what to look for.

"Yes, of course. Have you been with these guys before?"

I nodded.

"And you can remember all the details of the meetings when they put you back on Earth?"

I nodded again.

"Wow, interesting idea. I'm not allowed to do that. If I saw you tomorrow in Redmond I wouldn't even know that we had this conversation."

Just then the ship rocked from an explosion. Gates jumped up and punched some buttons on a viewing screen, revealing an image of the outside. The ship was under attack. Huge plasma bombs were flying everywhere.

"IBM!! Dammit, they know I'm here. We'll have to head back and do this some other time. I knew this would happen when Rentsreg the Terrible took over IBM." Suddenly the ship swerved violently and went into high speed heading back to earth.

I blacked out during the high-speed flight and woke in time to see Gates escorted to the transportation beam. I yelled out, "Hey, you didn't tell me about Rentsreg the horrible or terrible or whatever. Who is it?"

Gates looked back at me, "Gerstner, you idiot. Rentsreg/Gerstner. Same thing. He's actually an alien. Just look at him. You can tell." He was beamed off back to earth before he could say any more.

An alien escorted me to the beam back point. "What about the consulting job?" I asked.

"Next time you need a column!" he said. ■

Copyright© 1993 by John C. Dvorak. All rights reserved. John C. Dvorak graduated from the University of California. He is a contributing editor of PC Magazine *and* MacUser, *and is considered by many to epitomize the contrarian view of things—a charge he vehemently denies. Dvorak's motto is: If you have nothing nice to say, then don't say anything at all.*

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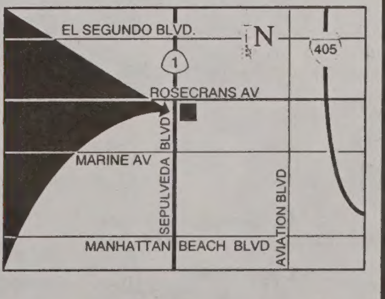

DOS 6
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DOS 6

How to Look a Gift Horse in the Mouth

Even a *free* memory manager may not be a bargain—especially if it can't give you all the memory you need.

Introducing QEMM 7 The Memory Manager Worth Paying For

The newest version of QEMM, version 7, pioneers new ways of using the critical area between 640K and 1024K. It optimizes this area, taking into account the many drivers that need more memory at start-up than when running; instantly calculating millions of possible memory configurations to find still more memory for your applications, TSRs and utilities to use.

Instant Riches

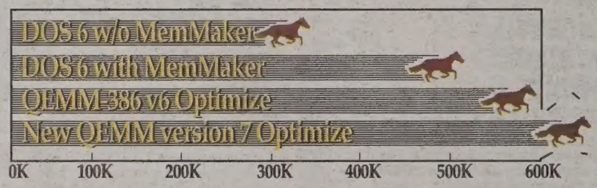
What does more memory mean in a practical sense? It means that your DOS and MS Windows programs run faster, smoother and more reliably. It means you can continue to add valuable utilities, drivers, TSRs and new capabilities to your PC. Whether it's workhorse drivers like LAN utilities and fax drivers; productivity-enhancers like disk caches and disk compressors; or fun and exciting capabilities like sound boards, CD ROM drivers, graphics tablets, etc. The better your memory [illegible] anaged, the more versatility and flexibility [illegible] PC will have. QEMM 7 lets you have [illegible] without fear of 'out of memory' messages or crashes.

The #1 memory manager for DOS & Microsoft Windows

DOS 6 Giveth; DOS 6 Taketh Away

The best feature of new DOS 6 is the stable of utilities it includes. Trouble is, they all eat up memory. DoubleSpace file compression needs 43K, Vsafe anti-virus needs 7-45K, Smartdrv disk cache needs 28K and even Undelete takes 10-14K as a resident program. Using MemMaker, you could easily lose—not gain— available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new DOS 6 features into account, finding ways to cut memory demands for these utilities by up to 80%, ensuring that the all-important memory below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting DOS 6's multiple configurations gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.)



We tested DOS 6 with and without MemMaker and QEMM6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

Page Frame: the Key to Your Future

There's been a lot of jealous talk about our patent-pending Stealth technology. Nobody else can duplicate its 48-115K gains.

The key to Stealth is its use of a 64K reserved area above 640K called the page frame. Besides being used by Stealth, the page frame lets Lotus 1-2-3 r2.x run larger spreadsheets and WordPerfect 5.x larger documents. It's also used by DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games for fast action. You sacrifice all this when other memory managers turn off the page frame. Stealth saves you room to set up your PC with a mouse, CD ROM, sound board, a network such as Novell NetWare, create 8-24K of extra memory for optimal MS Windows performance, use all of DOS 6's memory-hungry utilities and still have more than 630K to run applications smoothly and safely.

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1991 BYTE AWARDS OF EXCELLENCE
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1992 BYTE READERS' CHOICE AWARD

Prior versions of QEMM won just about every competition in sight, as well as remaining the #1 best-selling memory manager 5 years straight.

Put Your Money on a Winner QEMM 7

The new and ever more exciting capabilities coming to your PC will all compete for memory with your favorite applications, TSRs and drivers. And that makes QEMM 7 the most vital utility you can own.

Our seventh-generation memory manager is a thoroughbred that helps you get the most out of your PC today and tomorrow.

Quarterdeck

How we got the chart numbers CPU—486/33 ALR Power/business VEISA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons: in the CONFIG.SYS file: SETVER.EXE, DOS=HIGH, FILES=20, BUFFERS=10, STACKS=0,0, MVSOUND.SYS, SNDBK12.SYS, SLCD.SYS, DOS SHELL=statement, in the AUTOEXEC.BAT file: VSAFE, MSCDEX, UNDELETE, LSL.COM, NE2000.COM, IPXODI.COM, NETX OR EMSNETX, MOUSE.COM, SMARTDRV.COM, PRTSCCAP.COM. ©1993 Quarterdeck Office Systems. Trademarks are property of their respective owners.

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